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TRANSACTIONS

OF THE

MEDICAL AND PHYSICAL SOCIETY

OF

BOMBAY.

No. IV. NEW SERIES.

FOR THE YEARS 1857 & 1858.

Bombay:
PRINTED AT THE
EDUCATION SOCIETY'S PRESS, BYCULLA.

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SURGICAL CASES AND OBSERVATIONS.

By G. R. BALLINGALL, M. D.,

Assistant Surgeon J. J. Hospital, Professor of Surgery, Grant Medical College.

Presented, 1858.

The following cases and observations refer to—

1. Elephantiasis of the Scrotum.
2. Perineal Section of Stricture.
3. Aneurism of the Femoral Artery.

Elephantiasis of the Scrotum.

In laying before the Society the following cases of hypertrophy of the scrotum, it is not my intention to enter minutely into the pathology of the disease, the observations having been too few to enable me to do so. I propose simply to make some remarks on the selection of cases suitable for the operation, and on what seems to me the best mode of performing it.

Case 1.—P. H., a Parsee, aged 30, of intemperate habits, was admitted on 6th November 1854. The scrotum is described as being of the size of a double cocoanut, the skin thickened and indurated, and the penis buried in the mass. The disease was said to have appeared three years previously.

On the 8th November the tumor was removed, at the patient's urgent request. The operation was begun by slitting up the prepuce on a director, an incision was next made on each side down to the testicles, which were dissected up and laid on the abdomen, and the mass then rapidly cut off. A semilunar incision was made on each side, and the skin, which was there healthy, saved to form flaps. Six arteries required ligature; the folds of skin were then brought over the testicles, and sutures inserted. About twenty ounces of blood were lost.

With the exception of some oozing of blood after the operation, with occasional febrile attacks, nothing particular occurred in the progress of the case; and he was discharged cured on 5th February 1855. On 28th June last (1857) I saw him again, and examined the parts. There was not the slightest return of the hypertrophy; the flaps, which had been left, continuing perfectly healthy.

Case 2.—H. B., a Parsee, aged 29, of good constitution, and pretty regular habits, was admitted on 4th August 1856. The scrotum was of the size of a large pumalow, but the penis could be readily exposed. There was a cicatrix at the lower part, where an issue had been made by a hakeem. The disease was of nine years' standing.

On the 7th August the mass was removed by an operation similar to the last—side-flaps being left, but the integuments of the penis were less extensively removed. A hydrocele which existed on the right side was laid freely open. The wound healed well, and he was discharged on 3rd October 1856; at which time the integuments of the penis were much enlarged, apparently in consequence of the contraction of the cicatrix round its root, so that it was feared that the hypertrophied parts would require subsequent removal.

On 11th November he was re-admitted, in consequence of a small portion of the diseased tissue of the scrotum having been left. As it was increasing in size, it was dissected out, and on the 28th November he was finally discharged.

This man presented himself also on 28th June last, when the parts were found quite healthy,—the covering of the penis being in all respects natural.

Case 3.—P. S., a Parsee priest, aged 37, in an indifferent state of health, was admitted on 10th October 1856, for abscess occurring in a hypertrophied scrotum. He stated that three months previously the scrotum had been tapped, and about a pint of fetid bloody fluid had been evacuated. Subsequently abscess formed and burst, leaving an open wound, which continued to discharge at the time of admission. The opening, being small, was somewhat enlarged, and the wound was healing; but he urgently requested the removal of the tumor, which he said was very painful.

On 5th November the hypertrophied tissue, which was only about double the natural bulk of the scrotum, was removed by operation. The covering of the penis was not interfered with, but it was not possible to leave flaps at the sides, as the skin there was affected. The patient's recovery was delayed by attacks of fever with bronchitis; and owing to the wound having to heal entirely by granulation, cicatrization was not complete till 14th February 1857, when he was discharged. I have since ascertained that he continues well.

Case 4.—M. B., a Mussulman, aged 30, was admitted on 30th October 1856. The scrotum in this case measured 9½ inches in length, 10½ in breadth, and 5 from front to back. Disease was of two years' standing.

On 5th November an operation was performed. There was only sufficient healthy skin at the sides to form two small flaps, and as they were not large enough to cover the testicles, these were turned over the abdomen, and retained there for some days, to check a tendency to venous hæmorrhage. There being hydrocele in each tunica vaginalis, the sacs were laid freely open. When suppuration had fairly commenced, the testicles were brought down to their proper position; granulation and cicatrization progressed slowly, and the wound was not closed till 12th February 1857, when he was discharged, there being some hypertrophy of the integument of the penis.

Case 5.—B. P., aged 44, Hindoo carpenter, was admitted on 14th February 1857. The scrotum was in this case of the size of a large water-melon. The disease commenced with a febrile attack and erysipelatous inflammation seven years

previously, and had increased by periodic accessions of similar nature. An eruption of vesicles yielding a milky discharge had occasionally appeared, with some relief to the pain. Two issues, one in the thigh, the other in the leg, had been kept discharging for periods of 1 year and 8 months respectively, without benefit.

On 17th February the scrotum was removed: sufficient side-flaps were left in this case; a hydrocele on the right side was opened, and as the tunica vaginalis was much thickened, a large part of it was cut away. The integuments of the penis were removed.

He suffered a good deal from vomiting after the operation, but otherwise the progress was favorable; and he was discharged on 13th April.

Case 6.—E. H., aged 50, Mussulman, was admitted on 20th April 1857, with hypertrophy of the scrotum, which was about the size of the patient's head. He suffered from frequent febrile attacks, with erysipelas of the part, leading to progressive increase of its size.

The treatment consisted, at first, in the administration of quinine; and on May 1st, his health having somewhat improved, an operation was performed. The integuments of the penis were not interfered with, and two flaps of healthy skin were obtained from the sides. There was a small quantity of fluid in each tunica vaginalis, but it was not thought necessary to evacuate it. The tumor after removal weighed 8 lbs. Notwithstanding an attack of dysentery, improvement was rapid; the flaps adhered over the testicles, and he was discharged cured on 3rd June.

Case 7.—P. R., Hindoo, aged 30, was admitted on 18th April with hypertrophy of the scrotum. The tumor was of considerable bulk, (the measurements are unfortunately not recorded, but it was about four times the size of the patient's head,) and an abscess had formed, which on being opened left a large cavity with dense walls, incapable of contraction. The patient was very anxious to have the tumor removed, but being an opium-eater, and otherwise in bad health, the operation was deferred till 6th June, by which time he had somewhat improved under tonic treatment.

The proceedings were similar to the last, flaps being left at the sides, but it was necessary to remove most of the integuments of the penis. There was a large hydrocele of the left side with thick walls, almost of the density of cartilage; and as the testicle was atrophied, the whole was removed by division of the cord.

Since then he has suffered a good deal from dysentery, but the wound has progressed favorably, and at present it is nearly healed.

Remarks.—I have brought forward the above cases as being, so far as I know, among the first successful operations in Bombay. This probably arises, not from the rarity of the disease here, but from the fatal results of two or three cases operated on some years ago. Elephantiasis of the scrotum is commonly met with in natives, though the tumors rarely attain the same bulk as in Bengal, and perhaps many other persons might be found willing to submit to operation; but I have thought it best to select favorable cases at first, as one death might deter a num-

ber from coming forward. In addition to the above cases, I have assisted Mr. Burjorjee Dorabjee in removing two growths of this nature, a cure being effected in each.

Of the pathology of the disease I can say little. It appears to be simply a hypertrophy of the tissues naturally existing in the scrotum, the microscope showing chiefly a quantity of white fibrous tissue, dense and close in its arrangement on the exterior, but towards the centre becoming loose and cellular, the areolæ being filled with a gelatinous fluid of, I believe, albuminous nature. Professor Webb, of Calcutta, describes unstriped muscular fibres as also present, but this might be expected, as Mr. Bowman and other anatomists have now clearly demonstrated the existence of such fibres in the healthy dartos.

The progress of the disease varies, the tumors in some cases growing slowly and with steady increase, while in others there are frequent attacks of erysipelatous inflammation, with fever of remittent or intermittent type, during which new material seems to be deposited, to be organized after the subsidence of the acute symptoms. In two or three instances there has been, from time to time, an eruption of vesicles containing a milky fluid, forming a distinct fibrinous coagulum on standing; and this seems to be a safety-valve by which the morbid material is thrown out, for all these tumors have been of small bulk. There is only one point on which I would remark: it has been asserted that, the disease being a constitutional one, operations are of no avail, as it is certain to return. Of this I do not think there is any proof; in the cases attended with periodic accessions of inflammation, the frequent recurrence of these must inevitably impair the constitution, and lead to internal organic disease; but if the local disease be thoroughly removed, the accessions cease, and there does not seem to be any tendency to return of the morbid action. My own observations have been too recent to enable me to determine this accurately, but the fact of the first patient continuing perfectly healthy for upwards of two years and a half is a tolerably strong argument in favor of the above view.

One point of importance seems to be the limitation of the disease to the scrotum. I believe that the integuments of the

penis, and the skin at the sides drawn down from the abdomen and thighs, do not generally participate in the morbid action; hence these may frequently be saved with great advantage as regards the rapidity of healing, and the ultimate result in a very small cicatrix. In the first two cases I had some doubts as to the propriety of leaving any portion, fearing a return of the affection in it, but the results have been in every way satisfactory. It must be remembered that I can only speak of growths of moderate size, which admit of being slowly and deliberately removed, for when they have attained a large size the fear of hæmorrhage renders it necessary to sacrifice everything to rapidity of operating.

As regards selection of cases for operation, we should, I think, chiefly be guided by the rapidity of growth, and by the presence or absence of periodic inflammatory attacks. Many tumors increase very slowly, and never attain any great bulk, so that the advantages of removal would not counterbalance the risk. Case 3 was, I think, an instance of this kind; the healing of the wound was as tedious as after removal of the larger tumors, and the sufferings of the patient were considerable. When, on the other hand, the disease is progressing rapidly, and is attended with recurring febrile symptoms, early removal should be recommended to prevent impairment of the constitution. Before coming to a decision, care should be taken to ascertain that an exacerbation has not recently occurred, as the œdema is very great at these periods, but often subsides very rapidly, leaving the parts nearly of natural size.

The following is the mode of operating which I have adopted. When the penis is buried in the mass, the first step consists in introducing a long director into the orifice of the prepuce, and pushing it up as far as it will pass; the parts are then slit up by transfixion with a long bistoury. The penis is then separated from the surrounding tissues, and held aside by an assistant. Two lateral semilunar incisions are then made, meeting in the perineum, the guide to these being the line of demarcation between the diseased and healthy skin, which can be readily determined by the hardness and density of the former as com-

pared with the softness and pliancy of the latter. Indeed, the distinctness of this line in nearly every case seems to confirm what has been said with regard to the limitation of the affection to the scrotum. When the integuments of the penis are healthy, the lateral incisions are made diverging from the under part of it. In either case the flaps thus formed are rapidly dissected off; the cord is then rapidly exposed, and the testicles separated and turned up over the abdomen. This can be done with very little cutting, the loose cellular tissue yielding readily. The neck of the tumor is then quickly cut across, and the larger arteries secured by ligature. Any portions of the diseased tissues are subsequently removed; and while waiting for the oozing of blood to cease, the testicles are examined with reference to the existence of hydroceles, which generally exist. If these are small, and the tunica vaginalis is tolerably healthy, they are merely laid freely open; but if the walls are very thick and indurated, they are removed with scissors. Were they to be left, an extensive serous surface would remain, the inflammation of which would interfere with the healing. When the bleeding has entirely ceased, the coagula are cleared away, the testicles are placed in their normal position, and the flaps drawn over them and secured by sutures. Even where the flaps do not quite meet, owing to deficiency of sound skin, it is best to insert the sutures, in order to keep the integuments in contact with the surface of the testicles; the pressure thus exerted favoring adhesion, in order further to secure which, great care should be taken to remove all coagula, and to see that oozing has fairly ceased. In the earlier cases sufficient attention was not paid to this, and adhesion did not take place; in the two last operations, more pains were taken, and the adhesion was perfect.

I have perhaps dwelt unnecessarily on these details, but have been induced to do so by a feeling that the steps of the operation are little known in this Presidency, and by a desire to direct attention to a piece of surgery not very dangerous to life, and at the same time affording great comfort and relief to the patient, whose existence is often embittered by the presence of disease in organs so important as those of generation.

Further Cases of Elephantiasis of the Scrotum.

Case 1.—R. V., a Hindoo, was admitted into the Jamsetjee Jejeebhoy Hospital on 1st March 1858 with considerable hypertrophy of the scrotum, the tumor measuring thirty-one inches in circumference, and forty-five from the pubes to the perineum. He was a young man, in tolerable condition, and stated that for about six years he had suffered from irregular attacks of erysipelatous inflammation of the scrotum, with fever of intermittent type, each attack being followed by an increase in the size of the tumor. On several occasions vesicles discharging a milky fluid were observed during the presence of inflammation.

On 9th March the tumor was removed by an operation, in all respects similar to that described in a previous paper, flaps of skin being left to cover the testicles, The growth after separation weighed twenty-five pounds.

The subsequent progress was entirely satisfactory, and he left Hospital on 4th April, the wound having almost entirely healed.

Case 2.—P. V., a Hindoo, was admitted on 14th May with an enormous tumor of the scrotum, reaching, when he walked, as low as the ankles, and rendering him unfit to move about. He was a man of upwards of 40 years of age, but in good condition, and had been suffering from the disease for ten years, there being, as in the last case, irregular accessions of inflammation, with fever; on several occasions abscesses had formed, and had been either incised or allowed to burst.

On 20th May the growth was removed, the testicles and penis being preserved; but, owing to the profuse hæmorrhage, skin-flaps could not be made. He suffered a good deal from shock, requiring the free exhibition of stimulants. The tumor after removal, weighed a hundred and two pounds. A few days afterwards, when, reaction was fairly established, the testicles were removed under chloroform, as it was found that, owing to the elongation of the cords, much pain was felt during dressing, and it was feared that he would be unable to bear the profuse suppuration. The operation was performed by simply grasping and dividing the cords; the bleeding was very slight, and no shock followed. Had the patient's condition allowed, this would have been done on the first day, but the exhaustion was too great.

Great relief was felt after the second operation; the wound granulated healthily, and he was discharged, nearly well, on the 19th July.

Case 3.—H. D., a Bhattia, about 40 years of age, came under treatment for hypertrophy of the scrotum, of several years' standing. The tumor was not a large one, and had not recently been inflamed, but the patient was somewhat emaciated and cachectic looking. He was consequently put under tonic treatment for about a month, after which the usual operation was performed, flaps being made and the integuments of the penis, which were healthy, being preserved. A moderate quantity of blood was lost, and he did not suffer from any immediate shock. The tumor weighed about twelve pounds.

On the following day there was considerable asthenic fever, with a frequent jerking pulse; typhoid symptoms appeared on the third day; and he died six days after the operation. The wound had latterly become dry and unhealthy, and the edges had separated, leaving the testicles exposed.

Case 4.—M. L., a Sonar, aged 44, was admitted into the Jamsetjee Jejeebhoy Hospital on 20th July 1858, with elephantiasis of the scrotum. He stated that about

twenty-four years previously the tumor had attained the size of a cocoanut, but from that time until about six months ago it had remained stationary. Repeated attacks of inflammation then occurred, with rapid increase in the size of the swelling, which, on admission, was as large as a water-melon. He had for some time been under treatment as an out-patient, in consequence of one of these inflammatory attacks, with considerable excoriation and watery discharge from the scrotum.

He was stout and apparently in tolerable health, but for many years he had been in the habit of taking opium, to the extent, he said, of 40 grains daily. He also occasionally used spirituous liquors.

These circumstances rendered the propriety of operating doubtful ; but as no distinct organic disease could be detected, and the patient was anxious for the removal of the tumor, the usual operation was performed on 29th July. Flaps were made, and the coverings of the penis left, but as there was hydrocele on each side, the tunicæ vaginales were slit open, and a portion of the right, which was much thickened, removed. There being some tendency to oozing, sutures were not inserted till about three hours afterwards, when, the coagula having been removed, several small vessels were secured, and the wound dressed. About twenty ounces of blood were lost in all, and he suffered very little from shock. The tumor weighed about twelve pounds.

Next day there was, as in the last case, asthenic fever, with a very frequent small pulse. He gradually sunk, notwithstanding the administration of stimulants, and died on the morning of the 1st August.

Remarks.—The two fatal cases resemble one another very closely in the progress after the operation, no immediate shock having occurred, but fever of very asthenic type setting in soon afterwards, and rapidly proving fatal. Unfortunately no post-mortem examination was obtained, but it is probable that obscure organic disease existed in both patients, fatty degenerations being, as stated by Mr. Webb, in the Indian Annals of Medical Science, very commonly or universally met with in the advanced stages of elephantiasis, whether of the scrotum or extremities. The cachectic appearance of one man, and the habits of the other, made me hesitate long before operating; and it was only at their own request, and after a long tonic treatment, that I consented.

The most important practical question in elephantiasis is as to the relation of the fever to the local disease, as affecting the prospect of permanent cure by removal. Mr. Webb, in the paper formerly alluded to, says, with reference to one variety of the disease, that it "has for its determining cause a peculiar intermitting fever, which, occurring generally twice in the month, and at the lunar changes, is called by the natives 'moon fever.'" Mr.

Waring, also, in a paper in No. IX. of the Indian Annals, asks—"Are we simply to look on the fever as one of the attendant symptoms of elephantiasis, and merely as symptomatic of inflammation of the lymphatic vessels and glands, or are we justified in regarding the inflammation of the lymphatics, the local pain and erysipelatous swelling, and the subsequent deposition of albuminous matter, constituting the disease known as elephantiasis, as a sequence or result of fever?" He afterwards observes—"The conviction on my mind undoubtedly is, that fever is the primary disease, and that the albuminous deposit and enlargement constituting elephantiasis are a secondary affection.

From this opinion I must beg to dissent, and shall now proceed to examine the arguments on which it is founded. It must first, however, be mentioned, that I have never had any experience of the disease except as it occurs in Bombay; and that, while Mr. Waring's cases were chiefly tumors of the leg, the scrotum is here more frequently the seat of the disease. This writer, however, seems to look on the two affections as identical; and when we consider the symptoms and progress, the morbid anatomy, and the not unfrequent occurrence of swelling of the scrotum, and one or more of the extremities in the same patient, there seems good ground for this belief.

His first argument is the regular periodicity of the attacks, as out of 224 cases the fever is said to have been irregular in only 43. This information seems, however, to have been derived chiefly from the statements of the patients themselves, which, I would submit, should be received with great caution, in consequence of the great carelessness and incorrectness of natives as to precise dates. Such periodicity can only, I think, be established by Hospital records or notes made by a medical man in private practice; and in cases which have fallen under my own observation, I have not observed any regularity as to the accessions of inflammation. Such cases have, I confess, been few in number, as the majority of the patients have only come under treatment when the disease was so far advanced as to require operation.

Mr. Waring says further.—"The succession of symptoms

would also tend to establish the same belief in the origin of elephantiasis. As a general rule, the febrile paroxysm precedes the local symptoms." This statement also requires, I think, more accurate observation, for, in my own experience, Natives have occasionally come under treatment for fever, as out-patients, and it was not till the second day that I discovered they were suffering from elephantiasis. A patient, who is now in Hospital, states distinctly that the inflammation precedes the fever; and from my own observation I can confirm his account of the order of symptoms.

But the strongest proof to me of the local nature of the disease is the result of removal. With one exception, all the patients on whom I have operated have continued nearly free of fever. In the two last successful cases the febrile paroxysms have ceased completely for several months, though previously they had been frequent; and in those described in a former paper, a similar healthy state has continued. The exception was No. 6 of those formerly reported, who was for some time afterwards subject to febrile attacks, which were at last cured by arsenic. This, however, I look on merely as a coincidence, as no inflammation accompanied the constitutional disturbance.

This question I look on as important, considering the opinion of Mr. Waring, expressed thus at the conclusion of his paper :— " In extreme cases (after a fair trial of other local and constitutional remedies) amputation may be necessary, but it appears to me that to resort to this extreme measure is worse than useless, if the patient remains in, or is permitted to return to, a locality where the local exciting causes of elephantiasis are in full force. Under such circumstances the disease will probably re-appear in some other part, unless indeed remedial measures, as quinine, &c., are adopted to ward off subsequent attacks of fever." Now, on considering the disease as it occurs in Bombay, I think that the freedom from fever of patients operated on several years ago holds out good hopes of permanent benefit from removal of the local affection.

In conclusion it is only necessary to state that in no case has the inflammation re-appeared in the flaps left to cover the testicles,

while by this mode of incision the healing process is much shortened. The fact of the erysipelatous swelling being always confined to the scrotum, and never extending to the abdomen, shows that the tissues of the former part are alone affected. Further experience has also confirmed the opinion formerly expressed, that operation should only be urged in those cases where the febrile paroxysms occur with short intervals, and where the tumor is rapidly increasing.

NOTE.—23*rd February* 1859—The two first patients whose cases are recorded in this paper continue well; and as I have frequent opportunities of seeing them, I am enabled to state with certainty that they are quite free from the frequent febrile attacks to which they were previously subject,—this fact bearing out my views as to the local nature of the disease, as opposed to its dependence on malarious fever.

Cases of Perineal Section of Stricture.

CASE 1.—I. F., a Portuguese, aged 30, was admitted into the Jamsetjee Jejeebhoy Hospital on 8th April 1856, with stricture of the urethra, through which a small sound was passed without much difficulty. The disease was of some years' duration, and dilatation had been, on several occasions, effected; but it was found that the contraction returned almost immediately on the cessation of treatment. During a former residence in Hospital, division was proposed, but the patient refused consent, being afraid of a fistula resulting,—an affection from which another man in the ward was then suffering.

Finding that the relief from dilatation was only temporary, he was now anxious to have an operation performed, and accordingly, on 16th April, the stricture, which was situated near the bulb, was fully divided on a grooved staff, and a large catheter then introduced and secured in the bladder. The quantity of blood lost was very small. About thirty hours after the operation he had rigors and delirium, with anxiety of countenance and prostration; but these alarming symptoms soon passed off under the use of stimulants, and the catheter was not removed until forty-eight hours had elapsed.

In the further progress of the case there is nothing to note particularly. The urine continued to pass for some time through the wound; this gradually contracted, and on 3rd June it had completely healed. The urine was passed without difficulty or pain at the time of his discharge, on 6th June; since which time he has not been seen.

CASE 2.—D. F., a Portuguese, aged 25, was admitted into the Hospital on 11th September 1856, with the usual symptoms of stricture of the urethra, which, on examination, was found contracted in several places; the narrowest portion a little anterior to the bulb, admitting only No. 1 sound. This patient ascribed the origin of his illness to gonorrhœa. He had been previously treated by dilatation, with temporary relief, and had suffered from perineal abscess.

From the date of admission till the 20th October the treatment by dilatation was steadily carried out, but with little success; no sound larger than No. 4 could be

got through the stricture; the cicatrix of the perineal abscess had re-opened, and a urinary fistula was established.

On 20th October Mr. Syme's operation was performed without difficulty or accident: the wound healed well, and he was discharged on 14th November. All the urine was passed by the urethra, which admitted No. 9 sound freely, and the fistula had entirely closed.

Case 3.—L. R., Christian, aged 20, admitted 26th January 1857. This patient's history was as follows:—In June 1855, he fell on the deck of a vessel, the perineum coming in contact with a projecting iron ring, which caused a small wound, with some hæmorrhage from the urethra. Retention of urine followed, necessitating the use of the catheter. On the third day, as he was still suffering from inability to pass urine, the catheter was tied in the bladder and retained for thirty-six hours. Repeated attempts were afterwards made to introduce an instrument, but always without success.

On 10th May 1856, he first came under my care, and although frequent and persevering efforts were made with sounds of all sizes, I never succeeded in getting one through the obstruction, which was situated just in front of the bulb.

The difficulty did not seem to be due to the tightness of the stricture, but to the existence of a false passage, into which the point of the instrument always slipped, generally causing slight bleeding, though no force was used. At length it was proposed to attempt the division of the stricture without a guide, and the patient was brought under the influence of chloroform, when the small grooved staff passed at once into the bladder without the slightest obstruction. The operation was therefore postponed, in the hope of being able to carry on the treatment by dilatation.

The former difficulty was, however, again experienced, until in August the staff was, after some trouble, introduced, and the urethra laid open, but, probably from insufficient division of the stricture, the catheter could not be passed as usual. Extravasation of urine did not, however, occur, probably in consequence of the opening being in front of the stricture; the wound healed, with the exception of a small portion, from which urine occasionally dribbled, and the pain which he had previously experienced was considerably diminished.

On 27th January 1857 he was in the same condition; he did not complain much of pain, and his general health was good, but there was great inconvenience from constant incontinence of urine, and he was anxious that something should be attempted for his relief. He was accordingly brought under the influence of chloroform, a full-sized staff was passed down to the obstruction, and the urethra laid open. With the assistance of the finger on the wound, attempts were then made to guide a small staff through the stricture; and, after a somewhat protracted search, a probe was at length got into the bladder through the wound in the perineum; along this the grooved staff was passed, and the contracted portion freely laid open. A full-sized catheter was then retained in the urethra for forty-eight hours, and the subsequent progress was satisfactory. He can now retain his urine well; there is no incontinence, and no pain or difficulty in micturition. When seen, about a week ago, No. 8 sound was without difficulty passed, and the only inconvenience felt is from the small fistula, which has not yet closed.

Note.—5th *February* 1859.—The fistula afterwards healed, and I believe this patient continues in a satisfactory state.

Remarks.—The first case is a good example of that form of stricture, unfortunately very common, in which the new tissues are of so contractile a nature, that if the introduction of sounds be discontinued, the disease speedily returns. The only peculiar feature is the occurrence after the operation of a train of nervous symptoms well described by Mr. Syme, consisting of rigors, delirium, and prostration; sufficiently alarming to lead to the consideration of the propriety of removing the catheter. Trusting, however, to the positive statement that these symptoms are rarely of any importance, I contented myself with prescribing ammonia mixture, and the catheter was not withdrawn till the usual time had elapsed.

Case 2 is an instance of another kind, in which dilatation, though steadily carried out, fails to effect a cure. After a treatment of nearly a month and a half, the largest sound that could be passed without using unwarrantable force was No. 4; and very little relief had been obtained.

Mr. Syme has been severely criticised for advocating an operation, alleged to be dangerous, in cases where an instrument can be passed through the stricture, and where, consequently, dilatation can be carried on. With regard to the danger, experience has shown that to be very much exaggerated; and all practical surgeons must be well aware of the frequent failure of the treatment by bougies. For my own part I confess to great doubts of the accepted theory of this method, viz. the pressure of the instrument causing interstitial absorption; for, however efficacious continued pressure may be in removing recent inflammatory deposits, I do not think we have any good grounds for believing that the slight intermittent pressure of a sound will excite the absorbents to remove the fully organised tissues met with in old strictures. In support of this view, I would quote the following passage from Mr. Paget's lectures on hypertrophy and atrophy, vol. i., page 89:—"Really the result seems to depend more on whether the pressure be occasional or constant. Constant extra pressure on a part always appears to produce atrophy and absorption; occasional pressure may, and usually does, produce hypertrophy." In short I doubt very much whether the treat-

ment by dilatation effects any thing further, in the majority of cases, than mere mechanical stretching of the parts; and hence, I believe, arises the rarity of permanent cures by it.

In considering the justifiableness of the operation, a point which is not sufficiently borne in mind is, that although stricture of the urethra is not an immediately fatal disease, its secondary effects, in keeping up inflammation of the bladder, and in eventually causing organic disease of the kidneys, undoubtedly tend to shorten life; and, hence, any operative measures for its cure are as warrantable as the amputation of a diseased limb, which is exhausting the patient by hectic.

Doubts have been thrown on the permanency of the cure by division, but Mr. Syme's experience of fifteen years is sufficient to establish the fact of its efficiency in this respect.

The third case differs materially from the others; and there are two points connected with it which deserve consideration,—the permeability, and the seat of stricture. It was an instance of what would probably have been called an impermeable stricture, a term which has excited a great deal of controversy. Mr. Syme, in asserting that strictures are never impermeable so long as any urine escapes by the urethra, does not for a moment mean to say that it is always possible to pass an instrument at the first attempt. The best proof of this is that in his work on stricture he states that, in three cases, he has been obliged, owing to the existence of false passage, to open the urethra in front of the obstruction, and guide the staff through with the assistance of the finger in the urethra. It was a firm confidence in the truth of his doctrines that encouraged me to persevere so long in the attempt to pass an instrument in this case, and the fact of the permeability of the stricture was fully established by the ease with which the staff accidentally glided into the bladder, on the first occasion when chloroform was given. The difficulty was due, not to the stricture, but to the existence of the false passage. As it might be said that the easy introduction of the staff was due to the alleged relaxation of spasm by the chloroform, I should mention that this anæsthetic was subsequently administered repeatedly on occasions when the instrument could not be passed.

Another much disputed point is as to the seat of stricture. Most surgeons assert that about a fifth of the cases occur in the membranous portion; Mr. Syme, on the other hand, maintains that it rarely, if ever, is met with beyond the bulb. On this point I can only say that, after a pretty large experience, I have never met with a stricture further back than the triangular ligament. The belief has probably originated from the fact that the point of a small catheter is very often obstructed in the membranous portion, a circumstance arising from the dilated and fasciculated state of this, in consequence of the frequent and forcible efforts necessary to expel the urine. This condition is described by writers on the subject; and it is easy to conceive that the point of a small instrument may get entangled in a fold of the mucous membrane. I think also that the end of the sound may frequently get into the sinus pocularis at the extremity of the verumontanum, a cavity often quite large enough to admit No. 5 or 6, as any one may verify on dissection. Acting on this view, I have, for some time past, in cases where difficulty has been experienced in fairly reaching the bladder, contented myself with passing the smaller sounds through the stricture; and when this has been dilated sufficiently to admit No. 7 or 8, I have never experienced any obstacle in passing the large sizes fairly into the bladder. There is often a slight obstruction at the prostate, but this is owing to the natural shape of the parts, and cannot in any way be attributed to contraction of the canal. The question is of importance, as bearing on the safety of the perineal section; for, if it were ever necessary to go deeper than the triangular ligament, the danger of extravasation of urine would be greatly increased. These remarks are called forth by a statement of a case in the last number of the Indian Annals, in which it is said that the urethra was cut open "from the arch of the pubes to the neck of the bladder"—an extent of incision quite unnecessary, if Mr. Syme's statements be correct. This operation is brought forward as a case of "Professor Syme's Operation," while in its performance one of his express doctrines is departed from; and had bad consequence ensued, discredit would no doubt have been thrown, unjustly, on his procedure.

With regard to the operation in Case 3, it was precisely that performed by Mr. Syme in the cases alluded to above. After opening the urethra, no attempt was made to dissect backwards: the depth of the parts, and the oozing of blood, must render any such trial hazardous and difficult. The only use of the incision was to obtain the aid of the finger in the wound, ultimately enabling me to find the posterior part of the urethra, which was laid open on the grooved staff, instead of being cut at random. My intention was, in the event of failure, to allow the patient to recover consciousness, when I hoped that the escape of urine might show the opening of the urethra,—a hint which might possibly be useful in any future operation of similar nature.

Aneurism of the Femoral Artery, cured by Pressure.

Case.—J. H., a Parsee shroff, aged fifty, was admitted into the Jamsetjee Jejeebhoy Hospital on 26th September 1858, with aneurism of the right femoral artery. The tumor was of the size of a large cocoanut, and extended from the middle of the thigh upwards to within two inches of Poupart's ligament; its shape was pyriform, the apex being above; and while the greater part was hard and resistant to the touch, anteriorly a soft fluctuating prominence was felt. Distensile pulsation was very distinct, and on applying the stethoscope, a loud bruit was audible all over the swelling, but most distinct superiorly, where the sound was double. On compressing the artery against the pubes, pulsation ceased, but scarcely any diminution in the size of the tumor was observed. The pulse in the posterior tibial artery was smaller than that of the left leg, and the superficial veins were distended, but the temperature of the two limbs was the same.

The patient was emaciated, and apparently in a bad state of health; he complained of throbbing pain of the tumor, and said that he suffered from irregular febrile attacks. The pulse was of tolerable volume, but soft, and the heart's sounds rather faint, though unaccompanied by bruit. He stated that about a year and a half previously he observed a small swelling of the size of an almond about the middle of the thigh, but could not remember having received any injury, nor had he been making any unusual exertion. Six months before admission he had been under the care of a hakeem, who applied about seven dozen leeches, and used counter-irritation, without any benefit. About the same time he was seen by Mr. Carvalho, who, recognising the disease, strongly advised him to come to Hospital. This, however, he deferred doing, till about a fortnight before admission, when he attended the Dispensary, but could not be persuaded to remain, as some Parsee holidays were approaching. The tumor was then much smaller, and it was evidently increasing very rapidly in size.

On 1st October the compressor was applied to the groin, but it was necessary to remove it in the evening, in consequence of the pain it caused. No diminution of pulsation followed. As it was impossible to apply a second compressor, owing to the size of the swelling, ligature of the external Iliac artery was considered necessary;

as, however, on examination the urine was found to have a specific gravity of 1040, and to contain sugar, a further attempt at compression was made.

On 5th October, at 1 P. M., Carte's compressor was accurately applied to the artery at the pubes, and the pad screwed down with force, sufficient to arrest, almost, completely, pulsation and bruit in the aneurism. At bed-time the pressure was slackened somewhat, in consequence of pain, and on the 6th, about 8½ A. M., the pad was removed altogether, pulsation and bruit having completely ceased. As a precautionary measure, slight pressure was applied a little lower down, but as it was not efficient, owing to the movements of the thigh displacing the pad from the artery, the instrument was removed about 3 P. M. The skin under the pad, though ecchymosed, did not seem to have completely lost its vitality. Occasional anodynes were given to relieve the pain, which was at no time very severe. There was scarcely any perceptible diminution of the temperature of the limb on the cessation of pulsation, and a few days afterwards it was somewhat hotter than the left leg.

From this date to that of his discharge on 21st November, the progress of the case was satisfactory; his health improved under tonic treatment, and he lost the uneasiness and throbbing pain in the thigh of which he had previously complained. After the first few days there was little diminution in the size of the tumor, and when he left, it was still of considerable size, and fluctuation continued distinct. The ecchymosed skin where the pressure had been applied gradually sloughed; the slough, however, was quite superficial, and though the process of separation and subsequent repair was very slow, the ulcer was nearly healed at the date of his discharge.

On 28th November he presented himself at the Hospital, when the tumor was found somewhat smaller, and firmer, as if consolidation were taking place.

Remarks.—The above is a good illustration of one great advantage of compression in the treatment of aneurism; namely, its applicability to cases in which ligature of the artery is inadmissible. The latter operation was, I think, clearly contra-indicated by the bad health of the patient, and the abnormal state of the urine; the slow separation of the slough, and the delay of the reparative process, showing what would probably have been the result of ligature,—secondary hæmorrhage at its separation, from imperfect obliteration of the artery. At the same time, the case was not favourable for pressure, as the tumor was increasing rapidly; and from the distinct fluctuation, it was evident that the deposition of fibrine on the walls of the sac was very partial. The chief difficulty was, however, the extent of the aneurism, allowing of pressure at one point only, for one of the chief features in the modern mode of treatment is the use of two instruments, applied to different parts of the artery, and tightened alternately, so as to lessen the risk of sloughing, and to diminish the pain, which was formerly the chief obstacle to the continuous applica-

tion of the pad. Owing to this circumstance, the compressor was here used more forcibly than usual, but I am inclined to think that but for this the result would have been less satisfactory. The duration of the actual treatment was very short; the instrument having been efficiently used for about twenty hours only, as I believe the artery slipped from under it soon after the re-adjustment. The time occupied in this mode of treatment is as yet very uncertain, varying from six hours to nearly as many weeks; and we are not yet in possession of sufficient facts to enable us to form any opinion as to the probable duration in any particular case.

It is perhaps premature to lay this case before the Society, the tumor being still of considerable size, but the only accident to be feared now is, suppuration of the sac,—an accident rendered more probable by the large quantity of fluid blood contained. Even in the event of this yet occurring, so long a time has elapsed since the cessation of pulsation, that the danger of secondary hæmorrhage on opening the abscess would, in my opinion, not be great.

CHEMICAL NOTES.

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Presented, 1858.

In a country which abounds, like India, in valuable and interesting productions of all the kingdoms of nature, the chemist need never be at a loss for objects of experiment and research. Time and opportunity only are wanting, and these, amid the manifold and engrossing duties that press upon almost all residents in this country, are just what it is so difficult to obtain; otherwise, I feel sure that Anglo-Indian contributions to science would be much more numerous than they now are. It seems to me, therefore, the more to be regretted that any results which may have been obtained, though they may be incomplete, or even negative, should be lost for want of being placed on record.

The subjects of the following notes came before me during the broken periods in which I have been connected with the Chemical and Pharmacological departments of the Grant College. In some of the cases the examination has unavoidably been left incomplete, either from the too limited quantity of material at my disposal, or from the temporary cessation of my connection with the College. I was unwilling to wait longer for opportunities of prosecuting my experiments, the occurrence of which is so uncertain, and I thought that the Society might possibly find in them, even in their present state, some little matter of interest.

I.

On the Presence of Nitrates in Mineral Waters, and on the production of Saltpetre.

Before proceeding to the immediate subject of my paper, perhaps I may be allowed to make a few general observations on the analysis of mineral waters; the popular notions regarding which I have found to be very undefined, if not incorrect. The resources of chemistry are sometimes over-rated and sometimes under-rated, and in both cases the effect is to discredit its professors,—in the one because the results fall short of expectation,—in the other because facts which can really be proved beyond dispute may seem to be beyond the power of the chemist to demonstrate, and are hence viewed with suspicion as being hypothetical, when they are not so.

In the analysis of by far the greater number of compound substances, certain preliminary operations, partly mechanical and partly chemical, are requisite, in order to bring the materials into solution, in which state only can the several acids, bases, metals, and so on, be removed from their combinations by the re-agents employed. But in the case of water, everything is already in solution, and it might be supposed therefore that the analysis must be a matter of comparative simplicity. Such, however, is not the fact; on the contrary, the very solubility of all the constituents deprives the analyst of one of the most ready and accurate means of separating them from each other. But there is another reason why the analysis is of a complex description, viz. the great variety of acids and bases simultaneously present. Each of the bases is, of course, capable of combining with any one of the acids; and as most waters are neutral to test paper, it follows that all, of both acids and bases, must be in some state of combination. The ultimate object of the enquiry is to discover what compounds—what salts in fact—are present in the water; and we are led to endeavour to separate them directly from each other. Now the ordinary method of separating salts which may be in solution together, is by evaporation and crystallization; by taking advantage of the various solubility of different salts at certain temperatures, some are made to crystal-

lize out from the hot solution, some as it cools, and others by gradual and spontaneous evaporation ; and in this way by a continuation of the process, the salts are finally obtained distinct. Such a process is applied, on a manufacturing scale, in the treatment of sea and brine spring-waters, &c.

But this method, besides being inconveniently operose and tedious, is far too rough and uncertain in its results to deserve the name of analysis. A modification, however, of this method was adopted in the earlier attempts at analysis, and promised to lead to more correct results with less loss of time. The water was first of all evaporated to dryness, and the saline mass weighed ; the constituent salts and other ingredients were then separated, one after the other, by the use of various solvents, which had the property each of dissolving some one or two only of these constituents. Thus alcohol dissolved out the alkaline and earthy chlorides ; then cold water, or a solution of sulphate of lime, dissolved sulphates of soda, potassa and magnesia ; ~~and~~ then weak acid dissolved carbonates of lime and magnesia, hot nitric or muriatic acid dissolved sulphate of lime and oxide of iron, and silica remained to the last undissolved. The bases in each little group could then be separated without difficulty by the usual means. A method of this kind will be found described in some of the earlier editions of Brande's Chemistry, and in similar works.

This method is faulty, for two reasons. In the first place, the solvents used are not altogether without action upon the constituents which they are presumed to leave behind, so that the several solutions are found to contain small quantities of the latter : accuracy, therefore, is impossible. The other reason is not so self-evident, but it is even more weighty ; it is, that there is no certainty that the salts thus obtained really existed in the water. The acids and bases contained in these salts were, of course, there ; but that they were combined each to each, in the manner represented by the salts obtained by evaporation, there is no evidence whatever to show. If we take the same acids and bases in a free state, cause them severally to combine in various ways to neutral salts, and then mix the solutions of these salts together,

we shall, on evaporating the solution, always obtain a saline mass of similar composition, however various may have been the forms of combination into which we had at first thrown the acids and bases. Thus, let A, B, C, be three acids, and α, β, γ, three bases, —suppose that on evaporating a solution which contains them in certain proportions, the following salts have been obtained α A, β B, and γ C. It is clear that this is not the only way in which these constituents may be combined; no less than five other combinations are possible, thus:—

1	2	3	4	5	6
α A	α A	α B	α B	α C	α C
β B	β C	β A	β C	β A	β B
γ C	γ B	γ C	γ A	γ B	γ A; *

and if the three salts formed by any one of those groups be separately dissolved, the solutions mixed, and the liquid evaporated, the residue will, in all cases, contain only the three salts first mentioned, viz., α A, β B and γ C. These salts are deposited in succession as the evaporation goes on, and it will be found, on investigation, that those which are first deposited are invariably the least soluble of all [in the case supposed, the nine] forms of combination which can be obtained from the acids and bases.

There is thus strong presumptive evidence that the arrangement of acids and bases which prevails in the dry salts is, so to speak, accidental, and that, whatever may be the combinations in the solutions, the salts may be, in fact, only formed at the instant of their deposition, under the influence of cohesive force, which is so well known to modify the mere chemical elective affinity. The phenomenon is, in fact, identical with the ordinary one of precipitation, and depends on the same causes.

The enquiry leads us back to doctrines which lie at the very threshold of chemical science—those of affinity and combination. In the last century, when chemistry was but in its infancy, Berthollet, a most accurate observer, came to the conclusion that

* It will be observed that in this table each binary compound occurs twice; the total number of binary compounds possible is consequently nine.

union and decomposition were not wholly determined by affinity, but that the relative *quantities* of the several bodies in presence of each other influenced the nature of the compounds which they might form, thus controverting the older views of Bergmann. But the promulgation by Dalton, in the early part of the present century, of the Atomic theory, and by Berzelius of his Electro-chemical theory, tended entirely to discredit the doctrines of Berthollet and his school. More recently multiplied research has turned the current slowly, but decidedly, in the opposite direction. The portion of Berthollet's theory which held that the relative proportions of the constituents in a compound might vary has, of course, been permanently exploded; compounds *when formed* must have a certain never-varying composition; but the question of the sufficiency of mere elective affinity to determine what compounds shall, in certain cases, be produced, has met with a different fate. Every day's experience brings proofs that, however true the Electro-chemical theory may be in a general way, there are a host of phenomena for which it fails by itself to account; temperature, state of aggregation, degree of solubility, and, what we are now chiefly concerned in, quantity,—all modify the results in a way different from that which the mere relations of affinity would lead us to anticipate. Still, however, the question before us remains unanswered,—What is the actual state of combination of acids and bases, so long as the solution is too dilute to afford a crystalline precipitate under the influence of cohesion, which, at a certain point, subverts the chemical affinities? It is evident that the ordinary methods of chemical enquiry are at fault, and a decision, if arrived at, at all, must be founded on other considerations. The following quotation from the last edition of Turner's Chemistry shows one kind of argument employed. After speaking of a supposed mineral water containing sulphuric and hydrochloric acids, and lime and soda, in which case, of course, sulphate of lime and chloride of sodium will be obtained on evaporation, he continues,—"The late Dr. Murray, who treated this question with much sagacity, observes that some mineral waters, which contain the four principles above mentioned, possess higher

medicinal virtues than can be ascribed to the presence of sulphate of lime. He advances the opinion that alkaline bases are united in mineral waters with those acids with which they form the most soluble compounds; and that the insoluble salts, obtained by evaporation, are merely products (as distinguished from educts). He therefore proposes to arrange the substances, determined by analysis, according to this supposition. To this practice there is no objection; but it is probable that each acid is rather distributed between several bases than combined exclusively with either." I may allude in passing to a curious observation which has been made by Dr. Struve, the proprietor of an extensive establishment at Brighton, devoted to the manufacture of artificial or imitation mineral waters. He finds that in mixing the saline solutions with water, not merely the proportions of the ingredients, but also a *certain order of mixing* them, must be observed, otherwise the water will not have in all cases the same taste; a proof, if the observation be correct, that so trivial a circumstance as this may determine the nature of the decomposition.*

During the last year or two an able English chemist, Dr. Gladstone, has occupied himself with this subject, availing himself, for the purpose, of the variations in the tint of coloured saline solutions when mixed with other salts, or diluted with water; and his results, though not absolutely conclusive, tend, I believe, to establish the truth of the opinion above advanced by Dr. Turner, that the acids and bases in a mixed solution are distributed in a more or less complex manner among each other, instead of being paired off two and two, under the operation of simple affinity.† Indeed, in the case I previously put, of three acids and three bases, it is quite possible that every one of the nine possible forms of combination may exist in

* See Miller's Elements of Chemistry, 1856, part ii. p. 1093.

† A summary of the latest experiments on this subject by Dr. Gladstone, and by Malaguti, will be found in the second volume of Dr. Graham's Chemistry, recently published; but by far the most complete and exhaustive view of the whole subject is given in the first volume of Gmelin's Handbuch der Chemie, a translation of the latest edition of which is now under publication by the Cavendish Society.

various proportions at one and the same time in the same liquid. It is clear, therefore, that the ordinary mode of exhibiting the constitution of mineral waters, by arranging all the acids and bases as combined to such and such salts, is unscientific; it is conventionally adopted for the sake of distinctness, and because the public, for whose benefit these analyses are generally made, require something easily intelligible. The misfortune is, that as every one is left pretty much to follow his own method of grouping, different experimenters who may have each made an equally perfect analysis of the same water, may exhibit their results in so very different a form, that no one would be able to divine, from mere inspection, that the water analysed had been even similar, still less identical in the several cases.

To chemists themselves the circumstance does not much signify, as they are able, by a few minutes' calculation, to re-arrange the constituents in any way most agreeable to their views; but the public are liable to be misled by it, and to imagine that all such cases of apparent discrepancy must arise from incorrectness or want of skill on the part of some or all the operators.

But the best way by far to avoid misconceptions of this kind, is to give, first of all, the positive results of the analysis, the actual quantities of each acid, base, or other constituent that have been obtained, and then, in a separate table, to arrange them according to such system as may be preferred. The figures in the first table can then be compared directly with those in another, which gives the analysis either of the same or of any other water. It is also to be regretted that no uniform standard of quantity of the water to which to refer the ingredients has been adopted. The standards used are not even of the same nature, some being of weight, some of measure. The former is the most scientific, and was used by Berzelius and many of the Continental Chemists, the quantity of water assumed being usually either 10,000 or 1,000 parts. In Germany the Prussian Civil Pound of 7,680 grains, equal to 16½ oz. avoirdupois, is made use of. But a standard of measure is now most commonly used on the Continent; this is generally the litre of about 35 fluid-ounces. In England the variety is most perplexing; in the older analysis

the wine pint is used, containing 16 fluid-ounces of 455·6 grain measures each ; in the later analyses the imperial gallon of 70,000 grain measures is preferred, but sometimes the imperial pint of 20 fluid-ounces of 437·5 grain measures each, or 8,750 grain measures in all, is used, and occasionally a bulk corresponding to 10,000 grain measures of water, or one-seventh of a gallon ; the last will not, in the majority of cases, differ by more than a very few thousandth parts from 10,000 grains weight.

In September 1851 the Medical Board sent me for analysis five bottles of well-water from Aden, each from a different well. These waters were all clear and colourless, neutral to test paper, and of a more or less bitter, nauseous, saline taste, like a dilute solution of Epsom salts.

The analysis was conducted in the usual way ; but from the small quantity of each water available, it was necessary to economise the supply as much as possible ; and any attempt to estimate the less abundant constituents, as bromine, iodine, fluorine, &c. was out of the question.

The first process in these analyses is usually to evaporate a portion of the water to dryness, with the view of ascertaining the total amount of solid matter.

The object of this is merely to give a check upon the total of separate constituents. Afterwards each constituent is estimated by itself, a fresh portion of water being used, if possible, for each. In the present case as soon as the evaporation had proceeded so far as to cause the commencement of crystallisation, pungent fumes of hydrochloric acid began to be given off in abundance. This was evidently owing to the presence of chloride of magnesium, which, like chloride of aluminum, is decomposed on evaporating its solution into the base and hydrochloric acid. As, from the small quantity of water sent me, I was obliged to employ the dry saline mass for the purpose of estimating some of the constituents, I did not dry the mass completely enough (that is at a high temperature) to make its weight an efficient control on the subsequent analysis, which, if I could have foreseen what afterwards occurred, I should certainly have done.

On summing up the amounts of acids and bases obtained, (hydrochloric and sulphuric acids, soda, lime and magnesia,) I was surprised to find that in four out of the five cases the acids were quite insufficient to neutralise the bases; in the fifth case the difference was unimportant. I naturally suspected some error in my analysis, and repeated a few of the processes with such small quantities of water as I could spare, without finding any errors of importance. I was driven therefore to seek for some other acid which must have escaped detection. Phosphoric acid was sought for in vain; but on applying the tests for nitric acid, it at once appeared that, in the very four cases mentioned, it was present in abundance, while in the fifth mere traces of it were found.

There are some substances which, from peculiar circumstances, it is difficult to estimate quantitively in a direct manner, and it has therefore been usual in compounds containing them to weigh all the other ingredients, and then set down the difference which remains unaccounted for as their weight. Boracic and nitric acids are of this class. The only method recommended for directly estimating the nitric acid of mineral waters was to precipitate the chlorine, iodine, and bromine by sulphate of silver, and then to distil the concentrated liquid with an excess of sulphuric acid. Nitric acid with a little sulphuric acid comes over into the receiver in which a solution of baryta is placed, with which the acids combine. By then slowly evaporating the solution to dryness in the air, the free baryta is converted into carbonate; water leaves the carbonate, and sulphuric acid dissolves the nitrate, in which the baryta being estimated by sulphuric acid in the usual way, the quantity of nitric acid equivalent to it is found. This is a very round-about process, and the distillation especially is most objectionable. The retort is pretty sure to break, unless a sand-bath is used, which retards the operation, and it is quite impossible to bring over the whole of the acid, which remains hanging about the body and neck of the retort. However, with the very small quantity of water that remained, I tried the process, and in one case succeeded in obtaining five-eighths of the whole quantity of nitric acid

to be accounted for; in the other cases the loss was much greater. I was obliged therefore to rest contented with estimating the nitric acid by difference.*

The waters from Aden were named as follows:—1, Banian well; 2, Parsee well; 3, Turkish well; 4, Jaffron well; and 5, Lower Tawella. Their composition is given in the accompanying tables; the specific gravities were taken at the temperature of the atmosphere, and reduced by calculation to 60°, the expansion being assumed to be the same as that of pure water. The quantity to which the contents are referred is the imperial pint of 8,750 grain measures, or one-eighth of an imperial gallon.

Names of Wells.	Banian.	Parsee.	Turkish Well.	Jaffron.	Lower Tawella.
Specific gravity at 60°	1007·2	1005·2	1005·1	1007·9	1004·4
	grains.	grains.	grains.	grains.	grains.
Constituents found.					
Chlorine	32·078	30·507	29·459	41·170	23·247
Sulphuric Acid	6·771	3·746	4·130	7·496	2·765
Nitric Acid	8·081	3·010	2·577	5·766	..
Magnesia	3·802	4·326	4·159	5·427	2·389
Lime	10·833	7·381	6·315	7·645	7·119
Soda	20·563	16·816	17·755	28·773	11·313
Carbonates of Lime and Magnesia	0·303	0·275	0·349	0·397	0·443
Silica	0·466	0·271	0·393	0·332	0·525
Arranged as—					
Chloride of Sodium	28·815	26·071	27·019	43·033	17·178
Sulphate of Soda	11·980	6·670	7·353	13·345	4·923
Chloride of Magnesium	8·842	10·060	9·595	12·622	5·558
Chloride of Calcium	12·909	11·627	9·671	8·324	13·967
Nitrate of Lime	12·332	4·576	3·935	8·657	..
Carbonates of Lime and Magnesia	0·303	0·275	0·349	0·397	0·443
Silica	0·466	0·271	0·393	0·332	0·525
Total Solids	75·647	59·550	58·315	86·710	42·594
Carbonic Acid, cu. in.	0·481	1·190	0·961	0·481	0·744

* Far superior modes of estimating nitric acid have been introduced within the last 10 or 12 years, but I was not then acquainted with them.

I was until lately under the impression that this was the first time the water of the Aden wells had been analysed. I find, however, that some years previously Dr. Giraud had cursorily examined seven specimens of such waters, at the instance of the Medical Board, with the following result, which he has kindly allowed me to communicate. I have added the third and fifth columns for the sake of comparison with my analyses.

Name.	Specific gravity of distilled water=1,000.		Saline contents.	
	At 80° F.	At 60° F.	In 2,000 Grains.	In an Imperial Pint.
1. Banian's Well.	999	1002	1·16	5·08
2. Bir ud Dowla.....	999	1002	1·50	6·08
3. Bir Zaweel.....	1000	1003	2·75	12·07
4. Jail Well	1001	1004	5·58	24·50
5. Bir Senar	1001	1004	8·41	36·94
6. Bir Zaffran..	1002	1005	10·04	44·15
7. (Un-named)	1000	1003	8·70	38·18
8. Ras Meil *(contained Bromine).....	....	....	59·00	258·12

No quantitative analysis was then made, but Dr. Giraud remarks that No. 7 contained a large quantity of salts of lime.

Amongst these waters, there are only two which bear the same name as those in my list, the Banian well and the Zaffran well. Whether the Zaweel is the same as the *Lower Tawella* of my list, is doubtful. But the difference in character of those two, as they appear in the two lists, is so great as not to be easily reconciled; either there must be some confusion of names, or the water of the wells is liable to very great variation in quality. Perhaps some of the Officers at Aden may be able to clear up this point. A list of the various wells in Aden, with an exact description of their localities, and other particulars, is much wanted.†

* From a well experimentally sunk on the Isthmus very near the sea, at the South Eastern extremity of the inner line of fortification, at the foot of the rocks, the water was at first sweet, but after a time the sea appeared to penetrate into it, and it became useless. *(See Lieut. Wilkins' Report.)*

† See Additional Note, page 40.

The discovery of so large a quantity of nitric acid in well-water was, at the time, I believe, unparalleled; but a few years after other cases of a similar nature were found to occur, and on this side of India. In 1854 some water was sent for analysis from Nassick, drawn from a certain well in the jail, which water was so impregnated with salts as to be unfit for any purpose but that of washing. Dr. Giraud found it to contain so much nitric acid that "on evaporating the water to dryness, and igniting the residue, copious red fumes of nitrous and hypo-nitrous acids were disengaged from the decomposition of the nitric acid of the nitrates, by the organic matter previously held in solution in the water."* Again, in the following year, four samples of water, from different wells in the town of Nassick, being sent for analysis, three of them proved to be ordinary spring-water, of tolerable purity; but the fourth, from the "Bhunder Kallee" well, was found to be even more strongly impregnated with nitrates than that from the jail. In this case, also, copious red fumes were given off in heating the saline residue. The proportion of silica too appears most unusually large; perhaps the sulphate of lime was not thoroughly extracted from it. The composition of these waters is given below. I have added a column with a view to facilitate comparison with my analysis of the waters from Aden. The nitric acid is estimated by difference. The water from the Nassick wells is said to vary very much according to the season of the year. These waters were drawn in October and November.

* Might not the red fumes rather be partly owing to the re-action of the hydrochloric acid disengaged from the hydrated chloride of magnesium, on the nitrates producing chlorine and chloro-nitric gases?

	Jail Well.		Bhunder Kallee Well.	
Specific gravity ..	At 80° 1002· At 60° 1004·5		At 80° 1004· At 60° 1006·5	
Constituents found.	In 10,000 grs.	In impl. pint.	In 10,000 grs.	In impl. pint.
	grains.	grains.	grains.	grains.
Chlorine (total) ..	5·6000	4·922	12 052	10·814
Sulphuric Acid ..	0·9974	0·877	4·021	3·541
Nitric Acid	....	(13·170)	22·655	19·951
Chloride Sodium..	8·4150	7·395	....	....
Soda.....	....	....	10·638	9·367
Lime	4·0254	3·538	7·305	6·432
Magnesia.....	3·7000	3·262	5·429	4·780
Silica	....	....	3·260	2·871
Arranged as—				
Chloride Sodium..	8·4150	7·395	19·972	17·590
Sulphate Lime ..	1·7064	1·499	6·879	6·058
Nitrate Lime	9·5992	8·436	12·896	11·356
Nitrate Magnesia .	12·2810	10·802	19·635	17·291
Chloride Magnesium...	0·6940	0·609	....	....
Silica	....	....	3·260	2·871
Total Solids..	32·6956	28·741	62·642	55·166

The existence of nitrates in mineral waters is no new discovery. Berzelius, writing in 1826, gives directions for the estimation of the nitric acid in them;* and H. Rose's Manual of Analytical Chemistry, published in 1830, describes the method for estimating it, which I attempted to apply.† The proportion, however, that is present is usually very minute indeed, and in the greater number of published analyses, it has escaped detection altogether. I have collected together, in the following table, all the analyses I can find on record, in which nitric acid occurred in any notable quantity. The number is very small. The quantity of water referred to has been reduced, for the sake of comparison, to the British imperial pint.

* "Analysis of Inorganic Bodies," translated by G. O. Rees, 1833, p. 88.

† Griffin's Translation, 1831, p. 374.

Locality.	Saidschütz* in ?	Saidschütz † (Haupt-brunnen.)	Flushing ‡ in Zealand, Netherlands.	Zwolle in Overyssel, Netherlands.	Svanda, § in Banat, Hungary.	Highgate, ‖ near old Church-yard
Well or Spring ..	Spring	Spring	Spring	Spring	Spring	Well.
Age or character of Strata.....	Volcanic ..	Volcanic	Alluvium on Eocene.	Alluvium on Eocene.	?	Eocene (gravel and clay.)
Name of Analyst.	Struve	Steinmann.	Gunning ..	Gunning ...	Ragsky	Noad.
Grains of Nitric Acid in Imperial Pint	0·781	16·459	1·463	1·120	2·379	4·238

I was struck with the circumstance that the springs which contained by far the largest quantity arose in a volcanic district.** The similarity in this respect of Aden, actually an extinct volcanic crater, is at once suggested ; the trappean formation of the Deccan, in which Nassik stands, is no less of volcanic origin, though under altered circumstances. May we surmise, then, that the volcanic nature of the superficial strata is in some way favourable to the occurrence of nitric acid? Before proceeding to this question, let us dispose of the other instances recorded above.

The occurrence of nitric acid in the Highgate well explains itself. The well is close to the old and crowded church-yard, the organic matter from which, undergoing putrefaction, evolves ammonia, and the nascent ammonia, oxidized by the atmospheric air in the loose earth, is converted into nitric acid. It is a notorious fact, that while the deep wells of London, which are sunk through the London clay, yield an exceedingly pure, though often alkaline water, the water of the shallower wells is generally con-

* Brande's Manual of Chemistry, 4th Ed., 1212.

† Ure's Dictionary of Arts, &c. 1851, Suppt. p. 266.

‡ Liebig und Kopp's Jahresbericht, 1854, p. 767.

§ Ibid., 1853, p. 712.

‖ Quarterly Journal of Cheml. Society, iv. 20; Pereira's Materia Medica, 4th Ed., i. 299.

** In the list given, in Ure's Dictionary of Arts, &c., Saidschütz is said to be situated in a volcanic region ; I have not been able to discover its precise locality. The most marked volcanic region in Germany is the Eifel district on the Rhine, although a line of volcanic action of older date extends from thence eastward as far as Silesia. (*See "Daubeny on Volcanoes."*)

taminated with organic matter and nitrates. In the water from the Parish pump of St. Clement Danes, in the Strand, which, in accordance with a venerable, but somewhat disgusting ancient practice, was placed close to the church-yard railings, the same thing was observed in a very marked degree. In the springs in the Netherlands, and the Banat mentioned in the table, the nitric acid is not present in any large quantity, and I have no data on which to explain its occurrence.*

Nitric acid is not a constituent of any rock masses or strata; it is found in minute quantity in rain water, but, with this exception, there is no doubt that it is exclusively formed at or near the surface of the ground: (the production of nitre in the so-called nitre plantations, is a notable instance of its mode of formation); hence, the nitrates must be among the first matters dissolved by the rain water as it percolates downwards, while the other salts are more gradually dissolved out at a greater depth. Considering the abundance in which alkaline and earthy nitrates are found on the surface of the ground in India, it is a matter of considerable surprise that they have not been observed more frequently in the water of springs and wells; but this, apart from the limited number and accuracy of observations that have been recorded, may be explained, I think, by the circumstance of their formation at the surface. The fact is that, unless the ground is unusually porous, or the fall of rain excessive, these surface salts are not carried down to any great depth; and as the upper surface dries, the saline solution continually remounts upwards by capillary attraction, leaving, by its own desiccation, the saline efflorescence which we observe so abundantly in the drier parts of India; thus the nitrates, for the most part, merely follow this alternating march from a few feet in depth to the surface, and *vice versâ*.

But if the concomitance of a large amount of nitric acid with volcanic formations be anything more than accidental, how are we to explain it? Let us enumerate the circumstances which

* Lyell mentions the existence of no less than "five distinct groups of volcanic rocks" in Hungary, and also that "pumice occurs in great quantity." (*Manual of Elem. Geol., 4th Ed.*, 421.)

are essential to the formation of nitric acid; they are:—1st, ammonia, or substances capable of producing it, as nitrogenous organic matters; 2nd, oxygen; 3rd, an alkali or alkaline earth, which, by its so-called disposing affinity for the acid, determines the combination. There is a fourth and scarcely less essential condition, the presence of a body which is capable of acting as a medium of combination between the oxygen and ammonia. Now, volcanic products are very rich in alkalies, and, what is more, they are in many instances exceedingly prone to decomposition and disintegration by meteorological agencies, whereby the alkalies become set free. Oxygen is, of course, always at hand. It is not so evident at first sight how volcanic formations can meet the remaining two conditions. Organic matter, as such, they can hardly contain; and, if ammonia is there, it is clear from their origin that it cannot be in the solid substance, but only in the interstices of the fragments or on their surfaces; and I see no reason why this should not be the case, but, on the contrary, much to make it probable. A great number of solids possess, in different degrees, the power of condensing gases upon their surface, ammonia in particular; and when the surface is multiplied by porosity of structure, this condensing power becomes perfectly enormous. The property is most marked in platinum finely divided, as in platinum black, less so in spongy platinum; less again, but still in a very marked degree, in charcoal, and by a decreasing gradation in pumice stone, oxide of iron, alumina, common clay, and sand. Has pumice, then, or pumice-like scoria, such as the loose cindery mass upon which the cantonment of Aden is built, the power of condensing and oxidating ammonia, in presence of the alkali furnished by its own disintegration? The question might be solved by an examination of the well-water of pumice-yielding districts. If Saidschütz be, as I suspect, in the Eifel district, this may well be the origin of the nitric acid in the water, as pumice is found in great abundance in the neighbourhood, especially of Neuwied and Andernach, being used as a building stone at the latter place. I am in doubt how far the occurrence of nitric acid in the wells at Nassik can be explained in this way, as it is scarcely probable

that porous scoriæ are found there. Perhaps, considering how very local the distribution of the nitrates is in these wells at Nassick, and the circumstance alluded to of the quality of the waters being liable to great and sudden variation, the nitric water may find its way from near the surface through open fissures in the rock, which allow it to pass at times with great freedom and rapidity.

Dr. Bradley notices the existence of scoriæ on the edge of the crater of the Loonar lake in the Dekkan:* does the water of the lake contain any nitrate? Mr. Malcolmson states the solid constituents in 1000 grains of the water to be:—

	grains.
Muriate of Soda.....	29
Sesqui-carbonate of Soda ..	4·2
Sulphate of Soda	0·1
Potassa	a little
	33·3;†

but nitric acid may easily have been overlooked. A fresh analysis of this water is much to be desired.

The question of the formation of nitric acid‡ and of the cir-

* Carter's Geological Papers of Western India, p. 766. † Ibid, p. 30.

‡ On the formation of nitric acid, see Liebig's Chemistry of Agriculture, part II. Chap. 8, and Knapp's Chemical Technology, I. 356, seq.

"Kuhlmann supposes that, in the formation of saltpetre, when the mixture contains no carbonate of potassa, but only carbonates of lime and magnesia, ammonia is first formed from the nitrogen of the decomposing organic matter; that this forms, with the oxygen of the atmosphere, nitrate of ammonia, which, with the carbonates of lime and magnesia, is decomposed into nitrates of lime and magnesia, and carbonate of ammonia, so that the ammonia is at once the agent in the formation of nitric acid. and of its transfer to the fixed bases. The same observer invariably found ammonia in the crude saltpetre ley, combined partly with carbonic acid, and partly with fixed acids. This is also in accordance with the experiments of Collard de Martigny, who found that when milk of lime was kept in a closed and partly-filled vessel, with a little ammonia, and frequently shaken, for six months, nitric acid was formed. Longchamp (Ann. Chim. Phys. xxxiii. 5; xxxiv. 215) maintains that nitrogenous organic compounds contribute nothing to the formation of saltpetre; but that the water contained in porous substances, such as chalk, absorbs oxygen and nitrogen from the air, and condenses them into nitric acid. The experiments of Gaultier de Chaubry (Ann. Chim. Phys. lii. 24), according to which great quantities of nitrates are found in limestone hills, which contain but a mere trace of organic matter, favour this view. It may, however, be admitted that, under certain circum-

cumstances which favour it, appears to be one of peculiar interest in this country, where the production of saltpetre is so abundant as to give India an almost complete monopoly of the article in the commerce of the world. What connection is there between the occurrence of carbonate of soda in the soil (*Sujjee muttee*, or Dhobees' earth) and that of nitrate of potassa? Does carbonate of potassa ever occur in the soil, as carbonate of soda does? I strongly suspect that the greater part of the nitric acid is, in fact, in combination with soda, and that in the rude native methods of extracting the saltpetre, the nitrate of soda is left behind in the mother-liquor, or drains away from the moist salts in the process of carriage. I would urgently recommend a more careful study of the nitre-yielding earths, as, if my conjectures are correct, an immense saving might be the result of the application of a little scientific knowledge; for I am persuaded that the productive power of India, in regard to the nitrates at least, is capable of being extended to many times its present amount.

In confirmation of the above view, I will mention the result of an analysis of a nitre-yielding earth, which was sent me from Patree in Guzerat,—the only substance of the kind I have had the opportunity of examining. It is said to occur in a space of limited breadth, extending from East to West, and not elevated. It was not a general sample of the soil, but the rich surface sweepings which contained the saline efflorescence. This earth contained the large proportion of 26·207 per cent. of soluble salts, the per-centage composition of which was as follows :—

Chloride of Sodium	56·507
Nitrate of Soda.....	24·126
Nitrate of Potassa.....	8·631
Sulphate of Magnesia	5·284
Sulphate of Lime	5·452
	100·000

stances, as in electrical discharges in the air, the nitrogen, the nitric acid, and the carbonate of ammonia of the atmosphere, contribute to the formation of saltpetre, without denying that, in ordinary cases, the nitrogen of the organic matter plays the principal part. (Gay Lussac.—Ann. Chim. Phys. xxxiv. 56; compare Fontenelle, Jour. Pharm., 14), Gmelin, Handbuch der Chemie 4te Aufl. I. 801.

Here it will be observed that although the total nitrates amounted to nearly 33 per cent. of the soluble matters, yet the nitrate of potassa was little more than a fourth of this, the greater part of the nitric acid being in combination with soda; and the disproportion is even greater than appears at first sight, as from the lower equivalent of soda, the nitrate of soda contains, proportionally, more nitric acid than that of potassa; the 24·126 parts of the former containing 15·327, the 8·63 of the latter but 4·615 of nitric acid. By the ordinary mode of crystallization, the greater part of the nitrate of soda would remain in the mother-liquor, and be thrown away. The remedy is simple enough in theory, viz. to add potash salts, or wood ashes, which always contain them, whence, by double decomposition, nitrate of potassa and a soluble salt of soda will be formed. I recommended a trial of this plan, but I have not heard anything of the result. It is the general practice in preparing saltpetre by the artificial method in Europe, to add carbonate of potassa to the crude solution as long as a precipitate of carbonates of lime and magnesia is formed, or, what comes to the same thing, until the liquor acquires an alkaline re-action. The liquid contains the nitrates chiefly of these bases, and the cessation of the precipitation marks the term of the decomposition; but when nitrate of soda is to be decomposed by these means, the manufacturer has no such guide to assist him. No precipitation occurs, and the first addition of potash renders the liquid alkaline, so that he must be content with noting the specific gravity of his crude liquor, and adding as much potassa as experience shall show him to be the minimum quantity requisite to increase the yield of nitre to the utmost. The most economical plan would appear to me to be, to add a portion of wood ashes to the earth under lixiviation; and then, when all the saltpetre has crystallized out in the ordinary way, to stir into the mother-liquors sufficient wood ashes to make the mass nearly solid, and to dry it with a pretty strong heat. The nitrates would thus be fully preserved in a portable, and not deliquescent form, and the extraction of the salts could be performed elsewhere; while, even if an excess of ashes were used, their potash salts could be made available by

the manufacturer, and would be worth the carriage. I regret not having paid attention at the time to the insoluble matters. I have searched for recorded analyses of a similar kind, but, to my surprise, I have been only able to find two old ones, by Dr. John Davy. One of the surface earth of the saltpetre-producing cavern of Memoona, in Ceylon, the other of the saltpetre earth of Tirhoot, in Upper Bengal,* and one by Mr. Stevenson, also, of saltpetre earth from the Tirhoot district,† the latter being an average sample of the ordinary soil, while that analysed by Dr. Davy was from the rich surface collections.

	Analysis of Earth.			100 parts of soluble Salts consisted of		
	Memoona (Davy.)	Tirhoot.		Memoona.	Tirhoot.	
		Davy.	Stevenson		Davy.	Stevenson
Nitrate of Potassa	2·4	8·3	0·7	72·7	63·8	12·3
„ „ Magnesia	0·7	..	..	21·2	..	..
„ „ Lime	....	3·7	0·9	....	28·5	15·8
Sulphate of Soda.....	....	..	2 7	....	..	47·4
„ „ Magnesia	0·2	..	..	6·1	..	..
„ „ Lime	....	0·8	..	....	6.2	..
Chloride of Sodium.....	....	0·2	1·4	....	1·5	24·5
Carbonate of Lime	26·5	35·0	44·3	....	..	..
Water and organic matter.	9·4	12·0	..	....	..	..
Matter insoluble in Nitric Acid	60.8	40·0	50·0	....	..	..
Total..	100·0	100·0	100·0	100·0	100·0	100·0

Lavoisier states that different samples of natural saltpetre in France yielded him, after treatment with potashes, from $1\frac{1}{4}$ to $5\frac{3}{8}$ per cent. of nitrate of potassa. Ragsky lately examined numerous samples of saltpetre earth (surface-sweepings) from Hungary, and found from 0·50 to 2·33 per cent. of nitrate of potassa. (In Hungary, an earth which yields 0·26 per cent. only, is said to be

* Knapp's Chemical Technology, i. 347.

† Journal of Asiatic Society of Bengal, ii. (1833) 23.—"On the manufacture of saltpetre, as practised by the natives of Tirhoot. By Mr. J. Stevenson, Superintendent Hon. Co.'s Saltpetre Factories in Behar."

rich.) The most remarkable thing in Davy's analyses, given above, is the almost total absence of chloride of sodium, and indeed of all soda salts whatever. Another notable circumstance is, that the richest earths of France and Hungary cannot be compared for productiveness with the random samples of Indian earths.

On referring to Mr. Stevenson's paper I find that it partly answers one of the questions that occurred to me, or at least gives some assistance towards answering it; and the statements are so much to the purpose, that perhaps I may be excused for quoting them:—

"The soil of Tirhoot almost everywhere contains a large proportion of saline matter, such as nitrate of potass (saltpetre), nitrate of lime, sulphate and muriate of soda, &c.,* but in general the muriate of soda is most abundant. The saltpetre (as well as the other salts) lies in patches, as it were, some parts being more productive than others, according as carbonate of lime or sand alternately predominate. By analyzing the different soils, I have found those places most productive of nitre to contain a redundancy of the former; and on the contrary, where the soil was unproductive, I found a redundancy of the latter substance. I am, therefore, naturally led to the conclusion that, carbonate of lime is one of the principal agents in the production of this article. This will also account for the district of Tirhoot being more productive of nitre than any other place in India, for almost half of its soil is calcareous."

Mr. Stevenson's observations therefore remarkably corroborate the views of Kuhlmann and others, as to the agency of carbonate of lime in nitrification; but may we ask, is limestone *essential?* Cannot the nitric acid be formed and combine directly with potassa or soda, as well as by the indirect process suggested by Kuhlmann? Is there in potassa any peculiar property or affinity which makes the combination of nitric acid with

* "I have not been able to ascertain whether the *sujji mati* (native carbonate of soda) is found in this district; as far as my own observations have extended, it does not form a part of the composition of the soil. I also could not detect any alumina, though it is likely some parts may contain it."

it more frequently observed than that with soda, or is it merely that the collateral agencies which determine nitrification happen, by some combination of circumstances, to be more frequently present when there is potassa in the soil than when there is soda; or is the fact simply that nitrate of soda, when it does occur, is often overlooked altogether? Is limestone absent from the soils which yield *sujjee muttee* or native carbonate of soda?* Is nitrate of soda never found in this soil, either when it is calcareous, or when not calcareous? what is the source of the carbonate of soda itself? could a solution of potassa or soda be substituted for milk of lime in Collard de Martigny's experiments with equal success?

With these queries I conclude, hoping to call the attention of those interested in developing the resources of India to these points, which are not only of scientific interest, but also (I think) of no little practical utility.

Additional Note on the Locality of the Wells at Aden (page 29.)

The cantonment of Aden occupies, as is well known, a portion of the crater of an extinct volcano. The outline of the crater is an irregular oval, two and a half miles long by one and a half mile broad, the longer axis lying East and West. On the South West the wall of the crater is steep and lofty, attaining in the highest part (Jebel Shumshum) an elevation of nearly 1,800 feet. On the opposite or North East side, which adjoins the Isthmus, the elevation probably does not average more than 150 or 200 feet. On the North West face the crest rapidly drops, and, by a deep cutting through the lowest part, the road from the naval station, in the inner harbour, enters the fortified lines. The Eastern margin of the crater is broken down altogether, the sea having breached it, and washed away a portion of the floor of

* In the Madras Presidency limestone does accompany the native carbonate of soda,—"A thick bed of lime frequently occurs at the depth of six or eight feet from the surface, covered by the dhoby's earth. The natives appear to be aware of this, and frequently dig in such localities in search of lime."—Hunter's Indian Journal of Arts, &c. i. 432.

the crater itself; the present beach is about half a mile within the original margin, of which a largish detached portion still remains in the small rocky island of Seera, whose fortifications protect the sea-face of the town. From the lofty South West peaks the ground rapidly descends, by a series of frightful precipices, alternating with rugged plateaus, to a space nearly level, but gently sloping towards the sea, and little elevated above it, which is occupied by the town and cantonments. This space is much longer than broad, and stretches nearly North West and South East from the sea to the main pass; to the North East it is closely flanked by the steep crags which form the crater's edge in that direction. It thus occupies something like one-third of the total area of the crater. To the South West its area is extended by three lateral valleys, which run up some distance into the rocky ground under Jebel Shumshum. The Northernmost, the Kussaf valley, is long, deep, and narrow; the next, the Tawella, is broader, but penetrates less deeply; and the third, the Hydroos, is still broader and less defined, the ground being much lower. Into these lateral valleys the drainage from the flanks of Jebel Shumshum makes its way, the principal part into the central or Tawella valley, in which a vast number of tanks, constructed some centuries back by the Arabs, but since filled up with rubbish, have been lately discovered and cleared out.

It may readily be supposed, in this arid climate, that the drainage is not much. The average fall of rain at Aden appears to be only about $3\frac{1}{2}$ inches a year, but it is subject to great irregularities: in some years scarcely any rain falling, in others as much as six or seven inches; generally coming down in a few heavy storms, which send a torrent of some magnitude rushing down to the sea through the cantonment. It is in the above lateral valleys that most of the wells which yield the scanty water-supply of the place are situated. The Bir-ud-Dowla, which yields the purest water, is at the very head of the Kussaf valley; it is 185 feet deep, and its bottom is 100 feet above high-water mark.*

* This is, in some respects, the most remarkable well in existence. At the time of the occupation of Aden, it was found in use, and of the same depth as at present, 185 feet, but only of 18 inches diameter; neither was it quite straight, as it had been

There are 30 other wells in the same valley, some of which give 3,000 or 4,000 gallons of sweet water per diem, others but a scanty supply. Some wells are 100 feet above the sea level, others far below it. The Banian well, one of the most copious, is about half-way down, and just opposite the mouth of a lateral ravine. The Parsee well is in the centre of the Tawella valley, and the lower Tawella is probably in the same neighbourhood. The Jaffron or Zaffran well, which supplies a great part of the native population, is in the town, close to the junction of the Tawella and Hydroos valleys; the Jail, with its well, is in the very centre of the whole area, equi-distant from the Kussaf and Tawella valleys and from the Eastern rocks. The Turkish wall well is so named from its water being appropriated to the use of the guard at the Turkish wall on the Isthmus. It is, however, within the cantonment, towards the upper part of the area, and not far from the Jail.

It thus appears that, generally speaking, the higher up the hill the wells are situated, the purer is the water,—a conclusion that might, without much difficulty, have been arrived at *á priori*. The saline ingredients are derived from the disintegrating scoriæ; and the further the water soaks through them, the more does it become impregnated with salts. In Lieutenant Wilkins'† Memoir it is stated that a special commission, appointed some years ago to inquire into the sources of water-supply at Aden, hesitated whether to ascribe the presence of water in these wells to local springs or to an under-ground flow from the mainland on the Artesian principle. It is certainly remarkable that any hesitation whatever should have existed on the subject. The least consideration of the geological nature of the peninsula of Aden

turned aside to avoid a projecting piece of hard rock. How it could have been excavated to that depth, with so confined a diameter, and in a curved direction, is almost inexplicable. It has since been enlarged to 18 feet diameter, with the view of obtaining an increased supply of water, but in vain: it yields nearly the same quantity as before.—(*See Lieutenant Wilkins' Report.*)

† "A report containing a statement of all the different attempts, and their results, which have been made since our occupation of Aden, to increase the water there." —By Lieut. H. S. C. Wilkins, Bombay Engineers. Placed by Government in the "Editors' Room," and published in the local newspapers.

must have shown that, as far as all human knowledge extends, the existence of such Artesian springs within it is absolutely impossible.

The volcanic rocks forming the basin probably become more and more compact, as the depth and consequent pressure under which they were formed is greater, so as to form a nearly impermeable cup-shaped cavity, filled with looser scoriæ—a sponge in which a certain portion of water will always be retained. On the other hand, as the volcanic cone, of course, slopes outward towards the sea, the conditions necessary for the retention of any large quantities of water on the seaward faces of the crater are wanting. The sea itself must form one side of any basin there may be; and where the looser rocks dip beneath its level, its salt water will easily penetrate and pervade them. In this case, any fresh water that soaks down will form a lighter stratum, floating, as it were, upon the heavier sea water, but with a constant tendency to sink away seawards and escape. Hence, except under very peculiar local conditions, any supply of fresh water obtained from wells there placed must be precarious, and, when obtained, liable to much variation.

The difference in the amount of salts in the water of some of the wells, as found by myself in 1851, and by Dr. Giraud four years earlier, is far too great to be the result of any casual error. It will be observed that the difference is all in one direction, the quantity of salts beng in all cases much greater in 1851; in the Zaffran well as 1·96 to 1, in the doubtful case of the Tawella as 3·53 to 1, and in the Banian well as high as 14·89 to 1. On the view above taken on the source of the water-supply, this is quite intelligible: if the rain is scanty, the under-ground water gets more and more saturated with the salts it dissolves out from the loose rock; when rain falls, the saline liquid is diluted with pure water. Now, the registers of rain-fall at Aden do not extend further back than 1850, in which year there fell 5 inches; in 1851, 1·50 inches; in 1852, 6·25 inches; in 1853, 0·75 inches; in 1854, 6·65 inches; in 1855, 2·70 inches; and in 1856, 1·46 inches: average 3·47 inches. The fall in 1851 was therefore very small, much below the average, but, as there is no

record of the previous years, direct comparison is impossible; still, sufficient is shown to make this explanation the probable one.

It was remarked by Dr. Scott, when the original paper was read, that the three valleys in the Aden cantonment were sprinkled over with a vast number of graves; and it was suggested that the source of the nitric acid in the waters might be attributed to them. This is possible, but at the same time it must be remembered that the immediate neighbourhood of decomposing animal matter is not essential to the production of nitric acid. I do not know whether interments still take place in these localities, but if they do, there can be no question that the practice should be at once discontinued, and burials within the fortified lines of the crater, from whence alone drinking water is procurable, should be absolutely prohibited.

Additional Note on Nitrification.

As I have already touched upon the question of nitrification, it may not be out of place to indicate the extent to which our knowledge of this process has been advanced by the most recent researches.

Nitric acid, it is well known, exists in the atmosphere, and is brought down with rain as nitrate of ammonia, together with an excess of ammonia in the form of carbonate. From the fact that Cavendish and others obtained nitric acid by passing electric sparks through moist air, the opinion has been hastily adopted, and diffused by means of the ordinary elementary works on Chemistry, that electric discharges in the air are influential, if not principal, causes of the production of this compound.

The exact and elaborate researches of our countrymen, Lawes, Gilbert, and Way, have demonstrated the fallacy of this notion. Large quantities of rain collected in the country during every month of three years, over which the experiments extended, the rain of thunder-storms, the condensed water of fogs and mists,

snow and hail, were separately examined by new and refined methods of analysis. The final result may be given in Mr. Way's own words:—

"It appears to me that all we can legitimately prove from these results is, that neither in the case of nitric acid nor ammonia is the quantity present in the air sensibly increased by such influences as electricity, heat, &c.; for, so far as the water of rain is concerned, these compounds of nitrogen are evidently inversely proportionate to the quantity of water falling. In the case of thunder-rain, the fall being slight, we have a large proportion of nitric acid, although, even then, not much greater than is found in the water of fogs and mists when the influence of heat and electricity is not supposed. Where, however, a fair quantity of rain falls accompanied with thunder, we find only the average proportion of nitric acid."

On the other hand, that nitric acid is produced naturally by the oxidation of ammonia, without the aid of other nitrogenous matter, was proved many years ago by the French Academicians, who, by hanging up a basket of purified chalk, saturated with carbonate of potassa, for a few months over a vessel containing putrefying bullock's blood, obtained a large quantity of nitrate of potassa.* By raising the temperature, this change takes place with increased rapidity. Dumas has shown, that by passing moist air mixed with ammonia over chalk moistened with a solution of potassa, at a temperature of 212° F., there is found, in the course of a few days, a considerable quantity of nitrate of potassa.† Here again chalk appears to be a necessary agent in the transformation;—the importance of chalk in both natural and artificial nitre grounds has been already alluded to. Mr. Boussingault has been engaged in a very extended series of experiments on the proportion of nitrates contained in natural waters of all kinds, from lakes, rivers, springs, and wells, and also in every variety of soil.‡ The results are most interesting, but I

* Knapp's Chem. Techn., i. 359. † Ibid, p. 358.

‡ Comptes Rendus for 26th January 1857, p. 108. Reprinted in the "Chemist." N. S. IV. for 1857, p. 497.

cannot do more than glance at the more prominent of them. As to the soils, few were altogether destitute of saltpetre. In the poor soil of dry and exposed forest land, the proportion is at its minimum : in a few such cases no nitrates could be detected. In cultivated lands, especially those in which carbonate of lime was naturally contained, or to which it had been artificially added, the nitrates were in very large proportion : in the earth of hot-houses, strongly manured, and kept at a high temperature, it was at its maximum. Argillaceous marl, though uncultivated, always contained much. In the chalk quarries at Meudon, near Paris, the upper strata contained nitrates in considerable quantity ; in the lower strata they were altogether absent. With regard to natural waters, their richness in nitrates was found to be intimately connected with the nature of the rock strata through or over which they had passed : in lakes surrounded by primitive (syenitic) rocks the merest traces of nitre were found ; in waters flowing from the sandy and quartzose rocks of the Vosges, scarcely stronger traces ; but in rivers that rise in or flow over calcareous soils, as the Seine, the proportion was very large, on an average equivalent to 15 parts of nitrate of potassa in a million of water, but varying from 6 to 62 parts in a million. His experiments also confirmed those of other observers as to the vastly increased quantity of nitrates in the well water of large towns. In the water of a great number of wells in Paris there was never less than the equivalent of 206 parts of nitre in a million, (= 1·80 grs. in 1 impl. pint,) rising, in particular cases, to so high as 1,000, 1,500, 2,000, and in the highest 2,165 in a million, equal to about 18·94 grains in an imperial pint,—nearly approaching the largest quantity found in the wells at Nassik. These estimations were performed by the direct method, or rather by two direct methods, which were always employed comparatively, namely, the decoloration of indigo and that of Pelouze, by a protosalt of iron and permanganate of potassa. (In Mr. Way's experiments, the proportion of nitrates being exceedingly minute, the process was different : the water was evaporated to dryness, the residue re-dissolved, filtered, and re-dried for several times in succession, whereby all the soluble organic matter became in-

soluble; the pure salts were then heated in a combustion-tube with oxide of copper, and the nitrogen estimated by Dumas' direct method; from this the equivalent quantity of nitrate of potassa was obtained by calculation). In most of the above cases, the occurrence of nitric acid is explicable and, in all probability, rightly accounted for, in the way I have already stated: the ammonia present in the air is brought in contact with oxygen highly condensed, perhaps in a liquid state, in the interstices of porous substances, as chalk, and oxidized to nitric acid and water; thus, $NH_3 + 8\,O = 3\,HO + NO_5$,—the excess of ammonia yielding the base, whose affinity for the nitric acid predisposes to the union; the nitrate of ammonia so formed slowly decomposes with the chalk into nitrate of lime and carbonate of ammonia, which latter salt, having a basic reaction, determines, as before, the formation of nitric acid; and so on, *ad infinitum*. Such is the plausible theory of Kuhlmann; and no better can be found.

But this theory leaves unexplained the occurrence of nitric acid in the atmosphere; ammonia there is truly, but neither chalk nor any other porous or gas-condensing material.

The action of electric discharges has been shown to be productive of no appreciable effect whatever. All that appears thus far is, that ammonia must be pre-existent; all nitrogenous compounds (nitric acid included) can, by simple means, be converted into ammonia: therefore nitrogen must already be in some previous state of combination, otherwise nitric acid will not be naturally formed. It is necessary to say "naturally," because we can form ammonia, and therefore nitric acid, from pure nitrogen, by the use of proper materials, aided by a very high temperature, under conditions, that is, which do not occur in nature.

But a very great step in advance has now been made; nitric acid has been obtained at ordinary temperatures without electricity, by the direct union of nitrogen with oxygen. On the 26th November 1855, M. Cloëtz communicated to the Academy of Sciences of Paris a Memoir, containing the results of a series of experiments, of which the following is an abstract:—Atmospheric

air, after having been perfectly purified from every trace both of ammoniacal and acid vapours, by passing through tubes containing alkaline carbonates and sulphuric acid, was slowly drawn through a series of flasks containing various substances of an alkaline nature, and more or less porous. The experiment lasted about four months, in the autumn and early in spring, the mean temperature being probably below the average of the year, or 51° F,, So that it was little favoured by a high temperature.

The first four flasks contained fragments of recently calcined brick; in the first impregnated with solution of pure carbonate of potassa; in the second with precipitated carbonate of lime; in the third with precipitated carbonate of magnesia; in the fourth with both precipitated carbonate of lime and carbonate of potassa. "The next four flasks contained, instead of brick, fragments of pumice, first calcined with sulphuric acid, afterwards washed with distilled water, then again heated to redness without the addition of acid. Each of these flasks contained, like the first four, and in the same order, alkaline or earthy carbonates, alone or mixed."

The ninth flask was filled with broken porous bones, calcined at a white heat, and impregnated with a solution of pure carbonate of potassa. The tenth flask contained calcareous marl.

After now passing through a column of pumice impregnated with sulphuric acid, in order to remove any ammoniacal vapours which the air might have acquired from the last flask, the current passed successively into four flasks filled with uncalcined pumice, mixed with the same matters as had been added to the brick and calcined pumice of the first flasks.

The next four flasks contained—the first chalk, slightly moistened; the second calcareous marl, with alkaline carbonate; the third an intimate mixture, in the form of bullets, of decanted kaolin and precipitated carbonate of lime; and the fourth, argillaceous earth taken one metre below the surface. Of these eighteen flasks, nitrates were found after the experiment in considerable quantity in all those containing the brick, calcined pumice and ordinary pumice. In the chalk, the pure marl and the marl containing alkaline carbonate, and in the mixture of kaolin and

carbonate of lime, traces only of nitrates were found; in the calcined bones, and in the argillaceous earth, none whatever.

This experiment conclusively shows that, without the presence of any acid or ammonia, pure oxygen and nitrogen may combine directly to form nitric acid by contact with porous substances, containing alkaline or earthy matters.

A further step has been taken by M. de Luca, who has shown that porous subtances were not essential to this combination. Air was ozonised by passing over phosphorus, then purified by passing through carded cotton, and over potassa and sulphuric acid; the pure ozonised air then passed over potassium and pure potassa. In three months the potassium became converted to potassa and deliquesced, and from both alkaline solutions nitrate of potassa could then be separated by crystallization.*

Oxygen, then, in the form of ozone, required but the concomitant predisposing affinity of an alkali to unite at once with nitrogen as nitric acid. Ozone, as Schönbein has shown us, is produced whenever an electric spark traverses atmospheric air; hence in Cavendish's experiments it is ozone which is the medium of the combination, the water of the air and the gas jar playing the part of base, and not a feeble one, to the newly formed acid.

But ozone, besides being produced artificially during the slow combustion of phosphorus and by electric sparks, is a natural and normal constituent of atmospheric air: it is believed to be chiefly formed during the evolution of oxygen by the leaves of plants. It is comparatively abundant in the air of rural districts, but disappears almost completely in the air of large towns or in crowded dwelling houses. It remained, then, with regard to the nitrifying powers of oxygen and uncombined nitrogen, merely to put to the crucial test of more natural conditions the phenomena thus artificially evoked.

This also has been effected by M. de Luca. He prepared three sets of apparatus similar to those last described, but without the ozonizing portion, by which atmospheric air was slowly drawn, first through carded cotton, then over sulphuric acid, then over

* Comptes Rendus, December 31st, 1855.

potassium, and lastly over hydrate of potassa. Two such apparatus were set to work in the court of the laboratory of the College of France, and one in a hot-house of the Botanic gardens at the Luxembourg. The apparatus worked only during the day for six months; at the end of that time both the potassium and the hydrate of potassa had run down into liquid potassa in all. In this liquid, in the two apparatus in the open air at the College of France, not a trace of nitric acid could be found; in that in the hot-house there was abundance of nitric acid, so that nitrate of potassa had begun to crystallize out.

There are therefore two distinct methods in which nitric acid is formed in nature, which are alike only in this, that both are processes of oxidation, and that in both the presence of some powerful basic material is essential to determine the combination. In the one ordinary oxygen and ammonia are, by the agency of porous bodies, condensed in their pores, and in the presence of alkaline bases made to combine and form nitrates of such bases; in the other ozonised oxygen, whose affinities are vastly more powerful, unites directly with nitrogen in the presence of strong bases. Both these processes, there is every probability, go on incessantly; the nitric acid of the air being chiefly formed by the latter method, that of the soil chiefly, but not exclusively, by the former; not exclusively, because if ozone can oxidise nitrogen without the intervention of porous bodies, still more readily will it do so when it meets with them along with ordinary oxygen.

The question, in reference to the researches of De Luca, is of interest in another way, as it concerns the balance of organic nature. Hitherto it seems to have been the received doctrine that the quantity of combined nitrogen in the globe was constant, not susceptible at least of increase. Philosophers have, I know, been chary of broadly stating this in so many words, but it is tacitly assumed whenever the subject is touched upon in the works of Liebig, Dumas, and others of the organo-chemical school which they have established. It is concluded without dispute that the nitrogenous proximate principles of animal bodies are directly derived from the nitrogenous principles of the vegetables which form their food. Animals appear to be totally des-

titute of the power of assimilating nitrogen, as such; neither can they convert such simple compounds as ammonia or nitric acid into the complex principles of animal life. On the contrary, if the careful and concordant experiments of Regnault and Reiset, of Valentin and Brünner, and of Boussingault, are correct, a portion at least of such nitrogenous principles suffers entire destruction, and the nitrogen is evolved uncombined, for expired air always contains an excess of nitrogen, which can only be derived from the decomposition of nitrogenous compounds.

During the natural decay of animal structures the whole of the nitrogen is evolved in the form of ammonia, or of some of its modifications, and by this ammonia vegetables are nourished, and by further combinations the plastic materials which are to form the food of animals are built up. In this circulation of the nutrient materials of the animal and vegetable worlds, ammonia forms the zero point to which once in every round, the nitrogen compounds unceasingly returns,—not, however, as we have seen, without diminution.

Again, vegetables have as little power as animals to assimilate uncombined nitrogen, but their capacity to destroy such already formed combinations far exceeds that of animals; the oxygen exhaled by the leaves is invariably mixed with pure nitrogen, which in some cases equals, or even exceeds, the oxygen in volume. This nitrogen can only be produced from the decomposition of the absorbed ammonia, or its equivalent nitric acid.

Moreover the nitric acid which is formed so abundantly from ammonia is liable to total decomposition. Whenever gun-powder or similar mixtures are burnt, the nitrogen of the nitrate is evolved in a free state, no longer capable of taking its place in the series of transformations. The cycle is to some extent a double one,—nitric acid forming the starting point of a loop line,—in every stage of which except one the combined nitrogen suffers diminution, thus:—

1. Ammonia { 2. Ammonia 3. Vegetable* Principles 4. Animal* Principles / 2. Nitric acid* 3. Vegetable* Principles 4. Ammonia ..... } 5. Ammonia.

The points of the series at which this diminution occurs are marked by an asterisk.

Of the original formation of ammonia we know little. The numerous experiments, by which it has been attempted to show its production by the union of free nitrogen with nascent hydrogen, are all inconclusive. That it exists, however, in the interior of the earth, is shown by the fact of its almost constant occurrence in the vapors emitted from volcanoes, in the *Soffioni* of Tuscany (with boraccic acid), and in solid masses of rock-salt. In Liebig's words, it "has not been produced by the animal organism: it existed before the creation of human beings; it is a part, a primary constituent, of the globe itself."* But the amount given off into the atmosphere cannot be very great; hardly comparable, one would think, with the amount destroyed in the functions of animal and vegetable life. It is not, therefore, without some reason that the fears expressed in the following extract should have occurred to a thoughtful observer:—

"With regard to gun-powder, the question may well be raised, whether its use can be said to harmonise with the economy of nature. I do not mean by this the consideration that men and animals are killed by means of fire-arms, but rather the fact that by the combustion of gun-powder a portion of nitrogen, which formerly belonged to nature's capital stock of ammonia, is turned off into the atmosphere as free nitrogen, no longer capable of taking a part in the molecular transformations of the vital organism. The result, therefore, cannot but be that the capital stock of ammonia in nature will in course of time be diminished; for we are unacquainted with any natural phenomenon whatever capable of augmenting it. If this be the case, the vegetable and animal kingdoms must after some thousands of years suffer diminution."†

Our knowledge of the natural formation of nitric acid through the medium of ozonised oxygen, if worthy of interest on no other grounds, will at least satisfy our conceptions as to the universal harmony of natural operations, and will tend to relieve our fears for the well-being of a distant and, we may now hope, flourishing posterity.

* Agricultural Chemistry, 1st ed. page 109.

† Mohr's Commentar zur Preussischen Pharmacopœe, ii. 34.

MEDICO-TOPOGRAPHICAL REPORTS.

Presented by the Medical Board.

I.—TOPOGRAPHY OF BELGAUM.

BY T. WALLER, Esq., Civil Surgeon,

And Assistant Surgeon, Nuttall, 18th Regt N. I.

The town of Belgaum, commonly called by the Native inhabitants Shapoor Belgaum, is situated in 15° 52″ N., 74° 42″ E., altitude above the sea 2,260 feet, about 70 miles distant from the Coast, and 30 from the Western Ghauts, is the head quarter station of the Southern Division of the Army, strictly belongs to the Carnatic, though, by some, it is described as situated in the Southern Division of the Deckan; it lies in an undulating plain, bounded on all sides by ranges of hills and mountains, at distances varying from 5 to 15 or 20 miles.

These ranges are trappean, and attain to much the same elevation, four or five hundred feet at the most. This basin, as it may be called, is, in its turn, every here and there broken up by low, irregular, though more or less connected ridges of trap; on one of which the greater part of the cantonment is situated; and these ridges are, moreover, flanked more or less, by beds of laterite, which is observed in two conditions, undisintegrated, and in that of detritus. The greater part of the surface soil here is formed of decomposed laterite; below which red earthy covering we, as a general rule, come first of all to what may be called a "concrete" of a purplish colour, nowhere above a foot or two in thickness, made up of fragments of laterite *proper* (as it may be termed), pebbles, nodules of ferruginous clay, with, here and there,

small angular pieces of quartz, all cemented more or less firmly together. This "concrete," which appears in many places to have been subjected to the action of fire, and which is much used here for road-mending purposes, is commonly very friable, and easily disintegrated by the action of water. We next arrive at a layer of laterite *proper*, which is dry, soft, friable, cellular, and variegated, for the most part of a yellowish or reddish hue, and never of any great thickness, succeeded in turn by a bed of the same stone as is employed in so many parts of Western India for building purposes, and which it is unnecessary here to describe. This, near its surface, is tolerably dry and compact, but as we descend, it becomes gradually softer and softer, and of a more and more clay-like aspect and consistence, till water is reached. The trap rocks met with are, for the most part, greenstone and basalt; the latter of which is fine-grained, compact, brittle, and dark, with few or no crystals imbedded in it.

Belgaum is easily accessible from all quarters during the cold and hot seasons; in the rains, however, communication with the Presidency by sea is cut off for the space of three months or so. During the monsoon the wind blows constantly and with great force from the West. In the cold weather the prevailing winds are from the East; and, during the hot season, the wind in the morning is generally in the same quarter, but during the latter part of the day in the West.

With regard to the *hills* in the neighbourhood, only one (as far as I know) has hitherto been employed as a convalescent station. It is situated near the village of Patna, about twelve miles due West from camp, at the distance of fifty or sixty miles from the Coast; and appears an eligible enough site for a sanitarium, being accessible with comparative ease.

There are no *rivers* in the immediate neighbourhood; but tanks are by no means scarce, and wells are abundant. During the rainy season, the low grounds are very swampy; but the drainage of the high grounds is excellent, any water that falls speedily running off; and to this the salubrity of the station may in a great measure be attributed.

The *climate* of Belgaum is unpleasantly dry in the cold weather, and rather damp in the rainy. The heat—never at any time intense—from February to June is always greatly lessened by fine strong sea-breezes, which blow the greater part of the day, and well into the night.

The climate, although on the whole highly salubrious, does not always agree with persons on first arrival, head-aches being experienced.

The *soil* consists for the most of the débris of the decomposed volcanic rocks of the district; and according to local circumstances, it is either a red ferruginous earth mixed with vegetable matter, a mixture of red with black earth, the débris of the surrounding trap or black earth, itself the product of disintegrated trap. The first mentioned soil is very adhesive in wet weather, but turns very hard and liable to crack in the dry.

To the East of the cantonment and Fort the ground is quite level for some miles, and here rice, sugar-cane, and jowarre are principally cultivated; large herds of cattle graze over the plains and hills, which are not under cultivation; except in the immediate precincts of villages, there is little or no arborous or shrubby vegetation. Two species of Sesamum, Holcus sorghum, H. spicatus, dhall, Eleusine coracana, Zea mays, Panicum miliaceum, two or three species of Phaseolus, rice, Ricinus communis, are raised on the Western plains and undulations capable of cultivation. The language spoken by the majority of the inhabitants of the town is Canarese. Maratha is also understood by most of them, though not spoken correctly; to the North East, East, South West, and South, the Canarese language prevails. The inhabitants of the town have the appearance of being a mixed race, between the Marathas and people of the Carnatic; there are also many Madrassees, readily distinguished by their dark-black complexions, and slighter physical conformation. The people generally are more servile than the Marathas, and less independent in manner; conquered formerly by the Mussulmans, and over-run by both Pindarees and Marathas, a feeling of subjection is still clearly traceable in them. As a general rule, they are less cleanly than either the

higher or lower orders of the Deckan proper; their houses are inferior to those met with in Sattara and Poona, and are all badly ventilated. A general enumeration return of the inhabitants, taken on the 1st February 1851 by the Collector of Belgaum, gives the total amount as 15,244. I think 3,000 may now very safely be added, as the population increases yearly. The proximity of the place to the jungles of the Western Ghauts (which latter rapidly attract moisture from the ocean at the close of the hot season) has a very powerful influence in securing sufficient falls of rain, and ensuring average crops, while other more inland districts, about Sholapoor, Beejapoor, and Kulladghee, (and even Poona and Indapoor,) occasionally suffer from partial famine, caused by the uncertain and deficient falls of rain; the result being an occasional immigration of half-starved people into the more favoured districts. Needy adventurers from the Madras territories, also from the Nizam's districts, yearly tend to the increase of population.

For eight successive years, under my own observation, there has been no failure of the crops at Belgaum.

The agricultural population generally seem to be in easy circumstances: they have large herds of horned cattle (chiefly bullocks and cows), are industrious as cultivators, the drill-plough being commonly used. Large flocks of sheep are brought for sale from the Kulladghee and Neepanee districts. The lands intermediate, chiefly lying to the North East and East of Belgaum, hills and plains, otherwise sterile, afford sufficient pasturage for sheep, which meet with a ready market in the larger towns. The wool is, I believe, chiefly manufactured in the zillah into coarse gongrees or blankets, and numdahs. Very large droves of bullocks, belonging to Wunjarrahs or Lumbanehs, pass and repass the town; they bring loads of wheat and jowarree (Holcus sorghum), and bajree (Holcus spicatus) and koossoomba (Carthamus tinctorius), from the seeds of which an oil, used for burning, is made; the flowers are a dye stuff, often used to adulterate saffron: linseed, tobacco, gram (Cicer arietinum), mustard-seed, dhall, turmeric, Anethum graveolens, two species of Sesamum, coriander, Arachis hypogea, peas,

ginger, mussoor, a species of vetch, moog, oreed, red pepper, garlic, coarse sugar, cotton, rice. Many of these products are sold in Belgaum, and a large quantity is taken to the Coast, from whence salt, cocoanuts, and oil, spices, dates, cashew-nuts, fish (salted), are the principal articles imported into Belgaum and the different talookas.

A large quantity of coarse cotton cloths is manufactured by a class of weavers called joolies, and meet with a ready sale. Cotton fabrics are said to have formed articles of export from the Coast in very ancient times, and the manufacture is still continued. Various drugs and articles of English manufacture are largely imported in country carts, which are also much used in the conveyance of many of the above mentioned articles. Cordage is prepared from the fibre of the pericarp of the cocoanut (imported) and from two species of flax called by the Natives sun and ambaree, also from cotton, for tents.

Excellent iron (I have heard it stated to be nearly equal to Swedish) is brought from Tehgoor, distant about 24 miles, also from Patna (distant 21 miles), and from the neighbourhood of the Ramghaut, distant 30 miles; the latter iron is highly spoken of. Large logs of timber, for building purposes, are brought from the Madras territory, distant 8 days by bullock gharries. Sugar is brought from the same Presidency; also woollen and cotton fabrics of a superior manufacture. Excellent charcoal and wood are cheap, and procurable in large quantities. The bazaars are well supplied with beef, mutton, and vegetables, including peas and potatoes: fruit is somewhat scanty, but at times there is a tolerable supply. The bread issued to the troops, &c. is remarkably good; and it may safely be said that there are few stations where the rations are of a better quality. The water generally used is from wells, which are numerous throughout the Native town and Fort. There is one large tank close to the Northern side of the Fort, which affords a sufficient supply of water for cattle, and also for irrigation; and the Fort ditch also, after the rains, contains a sufficient quantity for the latter purpose. No malaria appears to arise from either. There is a large extent of rice cultivation to the South of the town, cantonment,

and Fort, but does not appear to be productive of any sickness whatever. The rice grounds are enriched by the deposit of silt washed down from the higher grounds to the Westward of the town. The flow of water to the Eastward is much retarded by a chain of hills in that direction. The general water-shed of the country is from West to East. There are no lodgements of water in or about the station that seem to me likely to generate malaria, or, by lowering the temperature at night, to tend to the production of intermittent fever. The wells generally furnish good water, but there is much neglect, indeed, I may say almost total neglect, in yearly cleansing them; the consequence is, that where surrounded by arboreous and other vegetation, for instance in the Fort, leaves and decaying vegetable matter accumulate in them, and must be prejudicial. A yearly removal of all such accumulations would greatly tend to the preservation of health, and should be strictly carried out by the Military authorities; the proper period would be in the hot season, when many of the wells become low enough to admit of all rubbish and mud being easily removed. All accumulation of dead leaves on the surface of the water should be prevented. Although percolating through decomposed and disintegrated laterite, trap, and mohrum, the water is soft and pleasant to the taste, when filtered. The Natives consider the water from wells dug in a laterite soil, or through dense trap rock, preferable to any other; they do not consider that dracunculus arises from the water of Belgaum, but very generally is developed in persons coming from Dharwar (distant 40 miles), the Bagulkote Talooka, Mingurrah, and Khanapoor. The worst form of continued fevers is, in their opinion, caused by using water from impure wells; and there can be little doubt that there is much truth in the supposition. The wells vary in depth from 45 to 75 feet, the deepest being in the camp where the European Regiment is located. Near the Native lines, which approach the rice cultivation, water is procurable from wells not above 15 or 20 feet deep. In the villages of Dannah and Yellooree, distant about three miles South of the cantonment, the water is hard; the soil produces fine crops of sugar-cane. This water is gener-

ally considered very wholesome for cattle. Not one case of dracunculus has been observed by me among the European Artillery during the five years they have been stationed at Belgaum ; and this fact would very strongly confirm the opinion of the Natives, that dracunculus is not generated at this station.

Another singular circumstance is the almost total immunity from cholera of the inhabitants of the Fort; at least during the eight years I have been at Belgaum, every case I have seen has been of persons residing outside the Fort, and brought to hospital for treatment. The disease has at times previled epidemically in the zillah, and to a considerable extent in the Native town, but never in the Fort, which is surrounded by a deep ditch and high stone wall. The ditch, as I have before said, is wet in the rains, and becomes dry in the hot season. The Natives attribute the exemption of the Fort from cholera to the constant scavenging going on : an immense quantity of vegetable and other refuse matters being annually disposed of by their daily removal to pits outside the Fort walls.

The Fort, which is of an irregular, somewhat oblong shape, the greatest length being from North to South, is nearly 2 miles in circumference, measured outside the ditch ; its site is low ; the walls, built of trap, measured from the bottom of the ditch vary in height from 30 to 40 feet. The ditch is deep, and broad ; and, as I have before said, dry in the hot season. A good deal of decaying vegetable matter, principally consisting of aquatic plants, confervæ, and weeds, undergoes decomposition at that period ; but whatever noxious vapours may be generated, they do not appear to cause ill effects, and if ascending (during high winds) above the level of the Fort walls, they must pass off in the higher currents of air. Laterite in the shape of coarse gravel, and earth of a brick-dust red colour, are met with in and on the West, North, and South West sides of the Fort ; on the Eastern side the country is low, and black soil, alternating with marl and loam, extends for many miles, laterite and trap occasionally appearing. The whole of the ground to the Eastward is highly cultivated with alternate crops, rice and sugar-cane being the principal. The area of the Fort is filled with gardens and public

and private buildings. There is a very great amount of arboreous and shrubby vegetation, with very fine tamarind trees, aleurites, or Belgaum walnut, a species of Euphorbium, cassias (of two species), caryota urens, growing to a very large size, ficus religiosa, erythrina, bombax santalum album, the loquat or eriobotrya Japonica, guava, custard-apple, plantains, peach trees, lemons, pummalos, papaw, casuarinas, cypress, forty or fifty species of roses, which thrive remarkably well, plumbago, kæmpferia rotunda, bearing very elegant blossoms, and mesua ferrea or nagchumpa.

Most exotic annuals thrive well; viola tricolor, dianthus, achimenes (several species), arbutilon striatum, cochlospermum, lychnis fulgens, phlox, caryopsis, nymophila, several cacti, gladiolus, begonia, oxalis (two species), thuribergia, lantana, tigridia, bignonia, venusta, hydrangea mutabilis, bougainvilleia spectabilis, various elegant convolvuli, heliotrope, honeysuckle, gloxinia, melastoma, poinsettia-clarkia-pogostemon (two species), sweet briar, myrtus, lavandula, andropogon, schœnanthus, are met with in the different gardens. Although much care is required in raising some of these plants, the fact of their growing goes far to prove the excellence of the climate, of which I shall speak hereafter.

All the various species of brassicæ, leguminous plants, potatoes, turnips, radishes, asparagus, Jerusalem artichokes, carrots, celery, with numerous others, are raised in abundance. All the gardens in the Fort are irrigated from wells, and no sickness appears to be caused thereby. The low situation of the Fort, and the large amount of trees and buildings, (as might be supposed,) cause imperfect ventilation; but on the other hand the shade afforded by the trees in the hot season tends, very materially, to moderate the heat and glare, which are very great, during March and April.

The roads about the cantonment and Fort are numerous and excellent; they are principally made of comminuted laterite, and, in some places, decomposed trap is used for metalling. They do not retain moisture, and rapidly dry after heavy rains, if a little sunshine follows. Communication with the adjacent towns of Dharwar, Kulladghee, Tasgaon, and others more distant, is kept

up at all seasons of the year; but little or no traffic by carts, bullocks, or horses, is carried on, during the monsoon, with Vingorla (on the Coast), distant 70 miles. Several new roads are now in course of construction in the zillah, two over the ghauts (Ambolee and Phonda), and the result will be a gradual, but, in the end, vast increase in the amount of exports and imports into the zillah. Nearly all the rivers are unbridged, and are crossed, during the monsoon, by boats. Carts are unloaded on the banks, the wheels are then taken off, and the merchandize, carts, wheels, &c. are then bodily lifted into the boats; bullocks, horses, &c. swim over. Great delay and inconvenience to travellers is the result of such arrangements. Some boats have platforms, on which carriages and carts can be run, but for the most part they are without them. With well-metalled roads, kept in good order, occasional bridges, and with boats, all having strong platforms, traffic could easily be carried on during the monsoon months, instead of, as now, being almost at an end for four months of the year. The principal animal products of the zillah are hides, horns, wool, skins of deer, tigers, cheetas, leopards, and bears. Iron ore is smelted in considerable quantity, and some of the metal, I have been informed by good workmen, is of excellent quality. Manganese is met with in the East and South East district.

I submitted the water from a well in the Fort to the following tests:—A solution of nitrate of silver gave a white precipitate, which proved soluble in ammonia, but insoluble in nitric acid, thus denoting the presence of chlorides. A solution of chloride of barium gave a white precipitate, insoluble in nitric acid, thus indicating the presence of sulphates, in all probability, of lime or magnesia, or both. A solution of oxalate of ammonia gave a white precipitate, indicating the presence of lime. Carbonic acid is also present in the water in minute quantity, and I have no doubt some salt of iron also, though I have not yet proved the latter.

Of late years great good has been effected by better draining and scavenging throughout the Native town. The gutters are capacious, and all accumulations of filth are easily removed from

them; the roads have been raised, and, on the whole, are well metalled.

The diseases to which cattle are subject are as follows, and the treatment is that followed by the Natives :—

Kurrunphod.—The symptoms are swelling of the belly, abstinence from food and water. Onions are administered internally as a remedy.

Sookeh Koond.—A sort of drying up of the system, with trembling of the limbs. Dry ginger, jowarree grain, and pepper corns are administered internally.

Modkey Koond.—Another form of the last disease. The limbs become paralysed. Beards of richal grass and green carunjah leaves are collected, and burned under the chest of the animal; the smoke being conveyed to the mouth and nostrils, half an hour daily, for three days.

Dod Byanee.—Violent diarrhœa, a very dangerous disease, decidedly epidemic. Remedy, internal exhibition of kēctkee and peephal ground up, and mixed with brandy or other spirit.

Payee.—An internal affection of the left region of the abdomen, said also to affect the human subject. Remedy, passing a heated iron (packing needle) for a short distance between the skin and muscles. Oil is then poured into the part, which penetrates around the iron.

Nurd Payee.—An affection of the glands of the throat. Remedy, simply rubbing turmeric and salt over the whole of the tongue.

Kull Byanee.—Foot disease. Local remedy, the water and brine left in preserving Goa salt-fish, heated and applied as a fomentation to the feet; the same water, &c. administered internally.

Bai Byanee.—Mouth disease, bloody foam from the mouth. Black jeera (trigoonella fenugreek), huldee, and salt, rubbed over the mouth and tongue.

The following grains are produced in the district: bajree (holcus spicatus), kooltee, a species of pulse or vetch on which horses are fed in the Carnatic, gram (cicer arietinum), jowarree (holcus sorghum), also called by the Natives cholum, four species, viz. jowarree karr, jowarree ken, jowarree yennee, jowarree salloo-

moong (phaseolus moong), ooreed,* a species of pulse or vetch, mussoor, peas,* teel* (sesamum orientale), black and white, species,—an excellent edible oil is made from the seeds; rice,* six species named as follows by the Natives: jeerasall, ambesall, guzrallee, moogud, dodga, hussia; toor, mutt, zea mays, cynosurus coracanus, savey, ralay, both a species of millet, ricinus communis, linseed, wurree, alsunda, awaray, sinapis, arachis hypogœa. Linseed oil in an adulterated state was formerly exported, but the seeds, owing to the late war with Russia, were last year in great demand, and were exported to about the value of a lakh of rupees, and are still in demand.

Intermittent fevers, rheumatism, venereal affections, and bowel complaints are the diseases most prevalent among Europeans. These fevers readily yield to treatment, and casualties under the head of "fever" are quite exceptional. Emetics, purgatives, and the subsequent use of quinine, pulvis cinchonæ, and infusion of kiraita, in combination, act very beneficially in these cases. Occasional remittent fevers are treated, and a combination of calomel, quinine, tartarized antimony, and a little morphia, with the use of the common diaphoretic mixture, with nitre, application of leeches to the head, or epigastrium, or both, and purgatives, given at such times as not to act during the cold or sweating stage, with cooling acid or cream-of-tartar drinks, with nitre, sponging the body and extremities, where great heat of skin prevailed, and the use of wine or æther, or both, in cases attended with sinking of the pulse, and anxiety during the cold stage, have been found successful in practice.

The rheumatic cases are by far the most troublesome met with at this station. The majority, I think, arise from a syphilitic taint in the constitution, and severe cases of rheumatism have been observed to follow syphilis when the latter has been treated both with and without mercurials, or mercury with iodide of potassium. The celebrated John Hunter was of opinion that some constitutions were, as it were, predisposed to become affected by the syphilitic virus, while in others it was innocuous.

* The articles marked with an asterisk are exported.

He mentions cases in which out of different individuals having connection with the same female, suffering from the disease, some would suffer primarily, others escaping, and of those infected, some (though treated alike) would escape secondary symptoms, while the others would suffer severely. Mr. Skey, Surgeon of St. Bartholomew's Hospital, is of decided opinion that some cases of chancre never terminate in secondary symptoms unless mercury has been abused. For these non-syphilitic chancres cases the term venerola has been used. I can safely aver from experience, that some chancres heal readily with little or no mercury, that others again are exceedingly obstinate under any treatment. I think Hunter's plan an excellent one, of rubbing in mercury below the lower edge of buboes, not on the swelling; and I have observed that the application of a saturated solution of nitrate of silver over buboes often disperses them; that blisters also, in some cases, act most beneficially. Five minims of creasote, half a drachm of conium, to a pint of water, is a useful application to obstinate chancres. The compound iodine ointment, with an equal part of cerat cetacei, also has been found very useful. As a general remedy in rheumatism, whether of syphilitic origin or otherwise, the following combination has been found of much service:—

℞ Potassii Iodidi ʒi, Liquoris Potassæ ʒiss, Vini Colchici ℥ss, Aquæ Menth. Pipt. ℥viiss; ℥ss thrice daily.

Hot baths, and the compound decoction of sarsaparilla, have proved most useful adjuncts. Compound tincture of iodine, soap liniment, a little chloroform, with camphor liniment, has proved very useful used externally. No cases of cholera or dracunculus have been admitted during the five years the Artillery have been at this station. The Hospital is situated in the Fort, and is within a few minutes' walk from the Barracks. It faces the South, and has two large well-ventilated wards. It is pucka built, with stone floor, chunamed over, and matted, and well raised from the ground; 14 men can be accommodated in each ward, and there are two small rooms for special cases, capable of containing one patient in each.

There is a surgery, cook-room, and capacious store-room.

The ground around is level; gardens, buildings, both public and private, and a road on three sides surround the wall of the Hospital compound; each ward has two ventilators in the roof.

The Barracks for the Artillery are also in the Fort. They are clean and well aired, having ventilators in the roofs of each building. There is a good bathing place for the men. I have no hesitation in saying, that these ventilators and bathing places have greatly conduced to preserving the health of the men, which is such that could venereal disease, excess in drink, careless exposure to the sun, and cold air at night, be avoided, sickness would be reduced I believe full one-half as compared with former years. The climate is excellent, and is fully proved to be so by the, generally speaking, very healthy state of the European children. It appears that the greatest number of funerals among the European community takes place in April, May, June, July, and August. Dysentery, diarrhœa, hepatic, affections, and head diseases, have been the principal causes of mortality. Intermittent fevers, bowel complaints, ulcers, affections of the air-passages, form by far the most numerous class of disease from which the Natives suffer, as the returns of Dispensary patients shew. The greatest number of admissions of Native patients is in the month of March, the least during the month of August, which appears not only from the Burial Returns, but those of the Dispensary, to be the most healthy month in the year. It would appear that the greatest number of funerals among the Native Roman Catholic population takes place in the months of February, April, October, and December.

From observations made during the course of seven years the average annual fall of rain would appear to be 52 inches and 40 cents; the average fall for July 20 inches and 10 cents.* During this month the weather is for the most part very stormy. The heavy rains which fall thoroughly cleanse the Native town, and at the same time lower the temperature. To these two effects of the July rains the healthiness of the month of August may be attributable. The average fall for the month of April is 2 inches and 7 cents, for the month of May 5 cents; and the average

* See Table p. 67.

fall for the monsoon months of June, July, August, September, and October, 44 inches 96 cents. Very severe storms, with thunder and lightning, occur in April. The heaviest of these are from the North, North East, and Eastward, and are frequently accompanied by heavy falls of hail, and always with torrents of rain. During the month of May the atmosphere is generally cloudy, especially towards the end. The temperature, though still high, is generally lower than during the month of April. The cold season is very trying to the constitution of some Europeans, and severe influenzas, with bilious complications, are occasionally met with in the cold months.

The Barracks and Hospital of the European Regiment are situated about 1½ mile from the Fort; the site is open and airy.

The Hospital is built on the brow of a hill, and distant from the Barrack about 600 yards, (the centre of the intermediate space being a ravine,) and about a quarter of a mile from the town of Belgaum and one and a quarter from the Fort. The entrance of the Hospital is to the South, facing the Barracks, the outward face of each side being East and West, and North and South. Its form is quadrangular; adjacent ground undulating. It contains two principal wards, which are on the East and West side; the third on the North; the first of which is an upper-storied room, with store-rooms, surgery, and Apprentices' room below."

Between these wards is the Hospital square; on either side of the gate is a guard-room and the Hospital Serjeant's quarters. A wall seven feet high surrounds the whole building. The female ward is separated by a wall, and is to the North of the building; the upper-storied ward has a boarded floor, which is water-proof; the rest are mud floors, and well raised from the ground, and each is surrounded by a verandah, 10 feet broad. The roofs of the Hospital wards are all furnished with ventilators.

The Barracks are situated on open, dry, elevated ground, are well ventilated; two new blocks have been recently built.

Register of Fall of Rain at Belgaum during 7 Years, from 1850 to 1856 inclusive.

Years.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Total.
1850	....	....	....	2·27	1·53	7·42	23·25	4·3	1·14	9·54	....	0·29	49·47
1851	....	....	....	1·86	4·31	6·98	29·40	6 6	6·25	2·21	....	0·92	57·99
1852	....	....	....	2·43	5·86	18·6	12·92	9·62	7·45	2·56	....	....	58·90
1853	....	....	....	2·4	4·89	8·4	38·50	5·55	3·7	2·24	0.27	....	64·60
1854	....	....	0·58	....	4·54	3·54	13·38	7·37	4·63	8·18	....	....	42·22
1855	....	....	....	4·12	1·25	8·17	12·29	2·52	5·27	6·73	0·11	0·33	40·79
1856	....	....	....	1·80	12·60	12·4	10·99	6·2	3·19	6·13	....	....	52·87
Total..	....	....	0·58	14·52	34·98	64·25	140·73	41·17	31·0	37·59	0·38	1·54	366·84
Average..	....	....	0·8	2·7	5·0	9·18	20·10	5·38	4·43	5·37	0·5	0·22	52·40

Abstract from Meteorological Observations made at Bel

From Daily Observations.	Hour of Observation.	Jan.	Feb.	March.	April.
Mean height of Barometer at.....	6 A. M.	27·498	27·232	27·525	27·440
	2 P. M.	·592	·573	·571	·502
Mean Range observed	..	0·094	0·341	0·046	0·062
Mean Temperature of the Air for each month, and for the year	6 A. M.	67·54	66·39	71·83	71·46
	2 P. M.	77·25	78·89	86·35	88·50
Mean Temperature of Evaporation for each month, and for the year..	6 A. M.	59·67	57·53	62·96	65·43
	2 P. M.	64·25	63·60	67·54	69·63
Maximum height of Barometer at ..	6 A. M.	27·640	27·638	27·594	27·494
Minimum „ „ „ ..		·480	·450	·398	·380
Maximum „ „ „ ..	2 P. M.	·666	·690	·640	·608
Minimum „ „ „ ..		·450	·494	·470	·420
Maximum height of Dry Bulb at....	6 A. M.	74	69	76	77
Minimum „ „ „		62	59	67	67
Maximum „ Wet Bulb at....		66	64	72	70
Minimum „ „ „		55	49	58	44
Maximum height of Dry Bulb at....	2 P. M.	80	86	92	97
Minimum „ „ „		61	70	83	71
Maximum „ Wet Bulb at....		76	68	73	76
Minimum „ „ „		62	58	64	54
Prevailing direction of Wind for each month.....	6 A. M.	N.E.	S.W.	S.W.	S.W.
	2 P. M.	N.E.	N.E.	N.E.	N.W.
Quantity of Rain in each month	..	..	..	..	..
Greatest quantity of Rain in 24 hours..	..	..	..	..	..

gaum, from the 1st *January* 1854 *to the* 1st *January* 1855.

May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Mean for the Year.
27·437	27·423	27·351	27·402	27·163	27·458	27·544	27·554	27·419
·476	·403	·359	·414	·172	·467	·562	·561	·471
0·039	0·020	0·008	0·012	0·009	0·009	0·018	0·007	..
73·45	75·53	70·25	70·25	67·00	70·54	65·64	65·90	69·64
88·29	72·20	74·12	71·32	74·26	75·32	76·10	75·29	78·15
68·96	70·53	67.19	66·50	66·00	66·61	61·00	60·48	64·40
73·35	71·03	69·90	71·22	70·30	69·90	68·00	65·93	68·72
27·522	27·470	27.468	27·500	27·528	27·550	27·616	27·642	27·555
·294	·294	·250	·300	·300	·314	·450	·508	·368
·550	·450	·440	·480	·542	·580	·678	·654	·581
·344	·334	·254	·342	·278	·322	·470	·500	·389
78	81	76	78	71	73	71	70	7450
70	72	68	69	66	68	64	62	66·16
71	75	70	69	69	70	68	66	69·16
64	68	62	60	63	62	59	53	58·08
98	89	79	77	77	80	78	78	84·25
82	73	70	73	70	70	72	72	72·25
77	77	74	72	74	72	71	71	73·41
63	68	67	69	67	66	62	60	63·33
S.W.	S.W.	S.W.	S.W.	S.W.	N.E.	N.E.	E.	..
S.W.	S.W.	S.W.	S·W.	S.W.	N.E.	N.E.	E.	..
								Sum.
5·92	2·01	16·88	8·42	4·68	3·75	1·75	..	43.41
2·60	0·43	2·92	2·48	0·93	2·25	1·68	..	..

Abstract from Meteorological Observations made at Bel

From Daily Observations	Hour of Observation.	Jan.	Feb.	March.	April.
Mean height of Barometer at	10 A.M.	27·585	27·607	27·555	27·528
	4 P.M.	·531	·544	·490	·479
Mean Range observed	..	0·054	0·063	0·060	0·049
Mean Temperature of the Air for each month, and for the year	10 A.M.	70·64	75·00	81·20	82·10
	4 P.M.	77·51	82·00	85 90	89·40
Mean Temperature of Evaporation for each month, and for the year..	10 A.M.	62·03	62·78	68·20	65·50
	4 P.M.	68·06	70·96	73·90	70·90
Maximum height of Barometer at...	10 A.M.	27·724	27·750	27·636	27·630
Minimum ,, ,, ,, ..		·464	·500	·428	·460
Maximum ,, ,, ,, ..	4 P.M.	·650	·674	·632	·582
Minimum ,, ,, ,, ..		·436	·432	·400	·418
Maximum height of Dry Bulb at....	10 A.M.	75·0	79·0	89·1	87·2
Minimum ,, ,, ,, ...		60·0	68·0	75·4	76·4
Maximum ,, Wet Bulb at....		60·0	68·0	79·3	75·3
Minimum ,, ,, ,, ...		57·0	59·0	61·5	60·5
Maximum height of Dry Bulb at....	4 P.M.	82·0	85·0	81·2	92·1
Minimum ,, ,, ,, ...		73·0	77·0	77·4	73·4
Maximum ,, Wet Bulb at....		77·0	82·0	79·3	78·3
Minimum ,, ,, ,, ...		62·0	67.0	67·4	63·3
Prevailing direction of Wind for each month.....	10 A.M.	N.E.	N.E.	S.E.	N.E.
	4 P.M.	N.E.	N.E.	S.W.	S.W.
Quantity of Rain in each month	..	..	..	..	3·46
Greatest quantity of Rain in 24 hours..	..	..	..	..	2·15

gaum, from the 1st *January* 1855 *to the* 1st *January* 1856.

May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Mean for the Year.
27·500	27·411	27·415	27·458	27·503	27·527	27·631	27·615	27·528
·464	·378	·392	·418	·447	·453	·564	·553	·416
0·036	0·033	0·033	0·040	0·056	0·074	0·067	0·062	..
84·20	77·70	73 01	73·72	72·30	74·17	73·43	70·75	75·68
90·30	79·50	73·36	75·88	75·77	76·50	78·44	77·23	80·14
70·90	72·43	70·75	69·72	68·90	70·13	64·29	63·77	67·45
75·40	73·50	70·81	70·69	70·88	71·15	66·26	65·95	70·70
27·568	27·496	27·478	27·532	27·574	27·646	27·694	27·612	27·611
·434	·300	·318	·396	·438	·410	·568	·490	·433
·538	·468	·470	·482	·514	·568	·626	·657	·571
·394	·220	·282	·384	·388	.336	·500	·488	·389
88·2	85·3	75·4	75·4	76·4	76·4	78·4	73·4	79·93
77·4	70·4	70·4	71·4	71·4	70·4	72·4	64·5	70·67
75·3	75·3	71·4	71·4	72·4	73·3	71·4	70·4	72·45
65·4	68·4	69·4	67·4	66·4	66·4	60·5	58·4	63·35
94·1	93·1	77·4	79·3	81·3	81·3	81·3	79·3	84·78
83·3	69·4	70·4	71·4	71·4	69·4	75·4	73·4	73·74
80·3	78·3	72·4	73·4	74·3	73·3	72·4	73·3	76·19
72·4	68·4	69·4	69·4	68·4	66·4	60·4	60·5	66·25
W. S.W.	S.W. S.W.	S.W. S.W.	W. S.W.	S.W. S.W.	S.W. S.W.	N.E. N.E.	N.E. N.E.	
0·55	5·32	16·85	2·91	5·81	8·43	..	0·70	Sum. 41·03
·35	1·50	2·85	0·54	2·20	2·29	..	·70	..

II.—TOPOGRAPHY OF RUTNAGHERRY.

BY. E. DE CRESPIGNY, M.D., Civil Surgeon.

Situation and Boundary.

Rutnagherry, in the Southern Concan, is 160 miles South of Bombay, lat. 16·18 N., and long. 87 E. It is the head-quarters of a Collectorate, extending Northwards 90 miles to Bankote Creek, which separates it from the Hubshee Country and the Sub-Collectorate of Colaba; and 80 miles Southwards to Vingorla and the Goa Territory. The average breadth is 40 miles; and it is bounded on the East by that part of the Western Ghauts known as the Seyedra range, which divides it from the Sattara Collectorate and the subsidiary States of Kholapore and Warree.

Aspect.

Rutnagherry is a straggling open town on the sea-coast, built partly on ground rising to an elevation of 150 feet (the slope facing the sea), and partly upon a strip of alluvium below, and where the houses are concealed by a dense mass of foliage. The public offices and military lines are on a plateau, which slopes up to a somewhat higher level beyond; but having an abrupt descent, on its Southern aspect, to a salt-water creek running inland, but not navigable for large vessels, though country craft of 70 or 80 candies can cross the bar at spring-tides, and anchor off the fishing village of Rajwarree, a suburb or portion of Rutnagherry. The surrounding country is broken into ravines and valleys, intersected by creeks of the above kind. These contribute with the steep and rocky hill-sides to render inland communication a matter of much difficulty. Intercourse is carried on with parts to the North and

Facility and mode of communication.

South by sea, at all times except during the prevalence of the South West monsoon. The anchorage is an open roadstead, where, except in the monsoon, country vessels can ride in safety under the lee of an old fort, standing upon a detached rocky promontory, which separates this bay from that of Miria to the Northward. Miria, a much larger promontory, one of the landmarks of this part of the Coast, has an altitude of 420 feet. The

Prevailing Winds.

prevailing winds from November to the middle of February are alternating diurnal land and sea breezes. The former set in an hour or two before sunrise, and blow till near noon; the latter succeed them, after an interval of calm, and continue till sunset. At such times communication by sea is easy and agreeable. From the middle of February to the first week in May, the prevailing winds are from the North and North West; and as these, setting in about 9 or 10 A. M., blow all day till near midnight, and often very freshly, they are, consequently, very unfavourable for small vessels bound to Bombay, though large vessels, by making long tacks, can beat up against them well enough. The communication inland is beset with many obstacles, owing to the surrounding country being broken into ravines and valleys, and intersected by creeks, as already stated. The monsoon sets in about the end of May, preceded by calms and a suffocating heat. The first burst is generally from the South East, in the shape of a furious thunder-storm. The rains continue, with an average fall of 120 inches, till the middle of September, with unsettled weather till the 10th or 12th of October; ending often, as it began, with storms from the Eastward.

Mountains and Ranges of advantage for Sanitory purposes.

There are no mountain ranges adapted to sanitory purposes nearer than the Ghauts, which, due East of Rutnagherry, do not attain a very great elevation.

The tides of the Indian Ocean have, on this part of the Coast,

Seas, Rivers, Lakes, Wells, Morasses, Drainage, Canals.

an average rise and fall of 16 feet. The shores are rocky, but there are numerous sandy bays; those of the creek above mentioned are muddy, as are also those of another creek to the

Northward of the town, a branch of the Miria or Kalbadavie creek. The muddy bottom of this is nearly dry at low water. It runs parallel with the sea, divided from it by a sand bank, partly cultivated and grown with palms; the borders of this creek are fringed with mangrove and other bushes; it carries off the water of a rivulet, having for source a spring which rises in a hollow on the other side of the higher level before alluded to.* This spring is never dry, and is resorted to by the sepoys of the detachment. Further down it supplies the dhobies with fresh water for their washing. With this exception, the water supply is drawn entirely from wells, which are numerous, and, for the most part, never failing. Drainage, properly so called, there is none: the town is traversed by a water-course, which is dry the greater part of the year, and, with the exception of two or three small tanks for the use of cattle, often putrid and full of confervæ in the hot season, there are neither canals, lakes, nor ponds at this station. The water of the creek is brackish six miles from the sea, and at Kutcherry bunder, a distance of twelve miles from the bar, it has dwindled to a streamlet.

Population and Dwellings.

The population of Rutnagherry amounts to about 10,000, and the number of dwellings 1,500. They are mostly single-storied, built of hewn stone, and tiled, or of large unburnt bricks (cakes of mud dried in the sun), and thatched with cudjans or straw. Houses of a better sort are constructed in the form of a square, with a courtyard, open to the sky, in the centre, with a raised dais or platform, verandah-like, raised about three feet or so from the ground; and from six to eight feet deep, which serves as a common apartment for the family; door-ways lead into back rooms, mostly dark and windowless, or out into a cattle-yard, with offices in the rear. The walls of the verandah are often daubed with grotesque figures of deities and animals, and hung round the cornices with small pictures of Bombay or China art. In other houses the open courtyard is in front, with a verandah and raised platform. Shopkeepers live in dark rooms behind their stalls, with a back yard for cattle, and offices in the rear, into which there is a back entrance from an-

* See "Aspect," p. 72.

other street. The dwellings of the poor are simply hovels, a few feet square, with a single doorway; seldom with a window or contrivance for the entrance of light or exit of smoke. The small rooms are divided, by matting of split bamboo or cudjans, into three or four compartments, into which are often crowded a family of eight or ten persons.

Clothing.

The clothing is similar to that worn by the inhabitants of Bombay and other parts of the Presidency where the Mahratta language is spoken; a peculiarity, perhaps, is the use, during the monsoon, of a thick cloak of red baize or flannel, which, though not exactly hooded, is so made as to wear over the head. The poorer classes have a piece of cloth called a 'coombly,' which they also hook over their heads, and which serves them for all purposes: to sleep under as well as for protection from the weather. These coomblees are made of wool, and are brought from the Southern Mahratta Country. Stout umbrellas of oil-cloth and cane-work are in use, and others made of palm leaves by the poorer people. Labourers have a contrivance made of similar material, which they suspend from their heads while abroad in the rain, or at work in their fields. All, with very few exceptions, sleep upon charpoys strung with coir rope. In some houses chairs and stools are seen, otherwise, with the exception of various brass domestic utensils, chests and boxes are the principal articles of furniture. The most striking of the household chattels is perhaps the large brass lamp and pedestal, standing often two feet from the ground. Bowls of coarse China porcelain, where used, are more frequently seen than English earthenware. There is no scarcity of sticks for fuel, though dried cow-dung is a staple item of economy. Sandals are much worn by all classes in preference to the shoes of red leather met with in the Deccan towns.

Bedding and Household Furniture.

Diet.

The universal diet is rice. This is the staff of life to a Concanee; also bread or cakes made of ground rice or wheat flour and ghee, with a curry composed of butter-milk, dhall, and onions; acidulated with tamarind or "kokum." Most householders grow their own

grain, sufficient perhaps for the greater portion of the year, and all keep a cow or buffalo for the indispensable butter-milk. Vegetables are sometimes used, fried in sweet oil and spiced. Fish and goat-mutton is eaten by Mahomedans and Hindoos of the lower castes. Sweet dishes, such as balls made of wheat flour, goor, and ghee, are indulged in only on festivals and holidays. Many families keep a store of yams for consumption. Natchnee bread is used by those too poor to afford rice; and a small grain called hureek, still cheaper, but which contains some deleterious principle in the husk, rendering soaking in hot water before cooking a necessary precaution, is eaten by the very poorest; as well as a cereal of the millet tribe, called wurraee. Cheaper too than gram or toor-dhall, is a small greenish pulse called ooreed. The meals are taken at noon and after sunset.

Customs and Amusements.

The customs and amusements are much the same as in other parts of the country. However, the following particulars may be worthy of notice. A game called soogtie, played upon squares like draughts, with stones or bits of ivory, is very general; also frequenting entertainments, consisting of country music, sweetmeats, and dancing girls. On certain festive occasions these entertainments are held in rooms well lit up and reeking with frankincense. The girls are professed prostitutes, who come here from Rajapore, Malwan, and Vingorla, the head-quarters of the caste, and where they are trained to the calling. There is a similar establishment near Goa.

Occupations.

Many of the inhabitants are engaged in trade as Banians, but there are many pensioners and Government employés, a few merchants or Soucars, Bunjarries, barbers, artisans, and some Christian labourers (Catholics from Goa and Malwan). Many coolies emigrate from the neighbouring districts to Bombay and elsewhere for employment; returning to their native village with their savings on the approach of the monsoon; others after service in the army return to share their pensions with friends and relatives. All hoard, though extreme poverty is often made an excuse for the non-payment of rental, &c. A rupee's worth of pice,

once turned into silver, is rarely changed. The Mussulmans are mostly fishermen or sailors employed in the coasting trade; their head-quarters are Hurnee and Vingorla. Others seek service as peons attached to the public offices. The fishermen pass the rains in spinning twine, mending or making nets, and in celebrating their marriages,—with them, as with the Hindoos, a great source of amusement and holiday-making. When not occupied in cultivation, labourers hire themselves out as begarries or coolies, at so much the day, or per coss of distance. Government officers moving in the districts, and travellers generally, have no other means of transport inland for their baggage and effects. These coolies carry everything on their heads, from a bundle of grass to a palankin with its occupant. Tobacco is generally, but moderately, indulged in by the Hindoos; the Mussulmans prefer it mixed with goor and spices. Opium and bang are not in much requisition, but there are consumers of nux vomica and thorn-apple. Sepoys and others drink a coarse kind of spirit called pfenny, distilled from toddy.

Modes of Cure.

Of the various modes of cure here practised, it were difficult to furnish any precise information. An account merely of the various articles in repute with the native Veyeds would far exceed the limits of a topographical report. A great variety of seeds, roots, barks, and other parts of plants, with their fresh russ or extract, unknown to fame and the Pharmacopeia Londinensis, are procurable in the Bazaar. Suffice it therefore if I subjoin a list of such drugs and articles of the Materia Medica found in the shops as are recognised objects of commerce, with such remarks as may be suitable in respect of their application here; premising thus much, that the people are partial to counter-irritants, for which especially they use the acrid juice found under the cuticle of the cashew-nut, and have frequently recourse to the actual cautery, scoring with no tender hand the integuments of both man and beast. This acrid substance they also use internally, made up into an electuary with goor, and prescribe it in worm cases. They give hemp seed and opium in dysentery, also opium and green tobacco. They use senna leaves and castor oil as a purga-

tive, but their only emetic is salt and water. In head-aches of all kinds a chunam plaster is considered a specific, as also chillies and nux vomica for cholera. They believe conscientiously in quinine and the Oleum Menthæ piperitæ, in the efficacy of inoculation for small-pox, and in fumigations for lues venerea, &c.

Drugs, &c. found in the Bazaar at Rutnagherry.

Drugs and articles of the Materia Medica found in the Bazaar at Rutnagherry.

Baubulaodeenk, acacia gum.
Loban, olibanum.
Dhoop, benzoin.
Versheesh, frankincense.

Sal-ammoniac, used by artisans.

Socotrine aloes, very good; used to stimulate the uterus in amenorrhœa, and in child-bed to excite the lochial discharge.

Alum, used by artisans.

Soomur, black sulphuret of antimony, used as a pigment.

Sofeed soomur, yellow sulphuret, in epistaxis.

Hing, asafœtida, for cooking purposes.

Raskapoor, corrosive sublimate, used with catechu and betel-nut in lues.

Para, quicksilver, ditto.

Borax, used by artisans.

Columba root (in slices), as a tonic, and chreat.

Gamboge, as a purgative (peeleea).

Camphor, for burning in the temples.

Catechu, extensively used.

Chalk and red chalk.

Sulphate of copper, by artisans, and made up with white of egg as an ointment to bubos; and Heerakus, sulphate of iron.

Cubebs, in gonorrhœa.

Maifur, gallnuts, very good in diarrhœa.

White lead, as a paint.

Moordasing, sugar of lead, in lues.

Shendoor, red lead, as a paint.

Linseed and mustard seed.

Heengul, Cinnabar, impure, contain lead on analysis; used for fumigations, also as a paint.

Opium and poppy seeds.

Kyful, Coculus Indicus.

Custooree, musk, as a stimulant, with pan soparee; very dear: costs rupees 16 to 18 the tola.

Myrrh, used in the same way as aloes.

Resin, tar, oil of turpentine; latter very bad.

Kochla, nux vomica.

Gunduk, sulphur; in scabies.

Zungar, verdegris, as a paint.

Saffron, the best or real saffron, very dear.

Hurtal, yellow orpiment, very good and brilliant, as a paint.

Ukalgurro, Pellitory of Spain, and acorus calomus.

Koorumbee, safflower, a red dye with lime.

Palas, a yellow dye; petals of Butea frondosa.

Somu (arsenic), used by the Gosains as a stimulant.

Lili (indigo), honey, liquorice-root.

Senna leaves and croton seeds.

Cardamoms, cinnamon, and spices of all kinds.

Walnuts, pistachio-nuts, kismis, almonds, dried dates, figs, and quince seed, star aniseed, cassia fistula, cashew-nuts, ground-nuts, dried plums from Cabul, myrabolans, marking-nuts, and soap-berries.

State of the Poor.

The poor have no provision. They beg their way from door to door, receiving charity in kind, mostly cooked grain. Many are Brahmin widows. The lame, the blind, and the deformed receive allowances from a charitable fund supported by the European community.

Children.

Children are kept at the breast often till they are three and four years of age, with a view to prevent pregnancy; they are carried sitting astride the mother's hip, or are rolled up in a fold of cloth when travelling, and slung over the back like an ordinary bundle. They are frequently drugged with opium to keep them quiet. The schools are well attended: upwards of 350 boys receive instruction in Mahratta reading, writing, and accounts; and 25 girls. 70 boys attend the Government English School.

Marriages.

The number of marriages annually celebrated at Rutnagherry amounts to above one hundred; they take place among the Brahmins during the first half of the year or transit of the sun from the Southern to the Northern tropic. Boatmen and fishermen celebrate their marriages during the rains, for the sake of convenience, being then most at leisure. From fifteen to twenty-five are sometimes registered by the Kazee at once. Some of these marriages, however, are contracted by parties residing at other towns and villages; others again are contracted by Rutnagherry people elsewhere.

Ratios of Disease and Mortality.

Longevity.

I am unable to furnish any reliable statistical details of the ratios of disease and mortality, nor of the degree of longevity enjoyed by the community. Perhaps no other part of the Presidency is so densely populated, with the exception of Bombay island; consequently, many instances of extreme old age may be observed. This fact may be accounted for by the great number of hardy old pensioners residing in the country; the Concan being the grand recruiting ground of the Western army.

Climate, Physical Character and Medical effects.

Thermometer.

The climate is truly tropical: the thermometer does not discover any considerable range either in its annual or diurnal relations; 20 and 12 degrees of Fahrenheit respectively may be considered a tolerably exact average. Although the extreme of maximum rarely exceeds 90°, on the other hand the minimum is seldom below 70°. The greatest diurnal range is in January, the lowest in July and August, at which period the mercury for days together stands steadily at summer heat. There is a great difference inland, both in the means and extremes. There are no hot winds; the hot March and April sun, which were otherwise insupportable, playing as it does on the bare rocks around, is moderated by fresh Northerly breezes, which set in an hour after sunrise, as described at page 73. Very oppressive heat characterises the greater part of May, productive of great exhaustion both to Native and European. Masses of cumuli appear on the Eastern horizon with lightning at sunset for some days before the first burst of the monsoon;

rain falls almost incessantly, or with an occasional three or four days' break, till the end of August, when it moderates, and is succeeded in October by very warm weather, until the regular occurrence of land and sea-breezes.

The climate may be considered favourable for recovery from miasmatic fever, even of long standing, and perhaps for rheumatism when the constitution is unimpaired; favourable for those whose livers suffer from the dry heat of the Deccan, unfavourable for constitutional debility, nervous affections, chronic dyspepsia, and all complaints requiring a light and bracing atmosphere; fatal in the monsoon to those subject to bowel complaint. Children thrive well, and appear for the most part plump and lively; yet those recently arrived from a dry climate are apt to suffer from boils. On the whole the climate may be pronounced healthy, though relaxing and enervating. No extensive series of thermometrical and barometrical observations have been recorded, as the station is unprovided with instruments.

Soil.

The soil is of two kinds, 1*st*, that of the slopes and hill sides, rising to two or three hundred feet, and is stony, heavy, and argillaceous, being the debris of a rock called laterite; 2*nd*, that of the valleys, which receiving the washings of the slopes, with a due proportion of decomposing vegetable matter, is of course more of an alluvial nature, and is on a level with the creeks and rivulets.

Geological Character.

The outline of the sea-coast cliffs is that of a low trap wall, abrupt and bluff, meeting the overlying laterite at various angles; or the laterite slope extends uninterruptedly from a flat summit to the sea-shore, concealing the trap with its detritus and boulders; and this is its usual character in the creeks and ravines inland; crowned sometimes with a scarp 10 or 12 feet high, whence these boulders have been detached, resembling at a distance overlying trap. Externally the laterite is black and vesicular,

Laterite Rock.

like scoriæ from a recent volcano. When quarried, it is hard, of a brick-red colour, and mottled from being traversed by elongated cells, which contain a yellowish clay. The cells are sometimes lined with a

vitreous substance. On exposure the clay washes or crumbles out, leaving the cells empty, and imparting a vesicular or honeycombed appearance to the stone. It derives its red hue from the iron it contains, and is sometimes rose-coloured; occasionally it has a metallic glimmer. The rock is laminated at intervals with layers of compact clay iron-stone, like flints in chalk. The deeper the laterite is quarried, the softer it becomes, and bluer and more plastic the clay in its cells. The soil accumulates in ravines and hollows; and where mixed up with detritus and pebbles of the same material, and cemented by iron oxide, has the character of conglomerate. The round pebbles do not present that vesicular appearance characteristic of the solid rock, as the cells have been refilled with alluvium, cemented, and hardened by iron. The soil in some places is only a few inches in depth; in hollows it may accumulate to several feet. At a depth of about 40 feet on the platform described at page 72, lignite has been met with in two places separated by a stratum 1½ feet thick of compact clay iron-stone from the laterite above, and resting upon the clay. The laterite in one place was thirty feet, with a superstratum of conglomerate ten more, with five feet of lignite, resting on blue or rather carbonaceous clay, where water was found. At the other, a thousand paces further inland, and on a higher ground, the laterite was 35 feet deep, without a superstratum of conglomerate, and the depth of the lignite and carbonaceous clay 17 feet more, before water was met with. At this place gravel underlies the clay, and the whole, judging from a water-course in a ravine to the right, rests upon trap. The lignite was partly compact, and partly fissile. It contained nodules of white iron pyrites; two varieties of mineral resin, one light-brown or fawn-coloured and opaque, the other yellow and transparent; both brittle, and burning with an agreeable odour. Charred nuts of a bilocular structure were also very numerous. Black sand of decomposed trap of the same sort as that now found on the sea-shore, with rounded pebbles of iron stone, pellets of blue clay, and particles of white clay resembling shelly or coral debris, was associated with the lignite in layers;

Laterite Conglomerate.

Lignite and Blue Clay.

but no shells or marine fossils of any description could be discovered.*

An argillaceous soil choked with undecomposing laterite detritus, constantly tending to become consolidated, cannot, in the total absence of limestone, be anything but unproductive and speedily exhausted, unless richly and abundantly manured. As it is, but for the heavy monsoon the slopes would be sterile. From this description it is evident that there can be no exhalations and evaporations of a deleterious nature except in certain confined localities; and with this exception, the suburb of Rajwarie and of that part of the town which lies buried in foliage on the alluvium below the slope, Rutnagherry is free from every thing of the sort; and whatever may arise from below to affect those dwelling on the plateau beyond is carried off or neutralised by the sea air.

Exhalations and Evaporations.

The trap is a fine-grained stone, corresponding with the older basalt of Bombay; but specimens shown me as coming from the Ghauts inland were amygdaloidel; one black, the other reddish and decomposing; the cavities were filled with plates of stilbite or some similar zeolitic mineral; also full of geodes containing chalcedony and quartz.

Trap Rock.

* The origin of this laterite has been a subject of much discussion (*vide* Carter in Trans. Asiatic Society Bo., &c. &c.) In the opinion of those most entitled to consideration, it has been regarded as a muddy product of volcanic action; and from this view I do not venture to differ. Admitting, however, the received doctrines of igneous interstratifications, and the Plutonic theory of the formation of primitive mountain ranges, the following conclusions may not be considered extravagant, based upon the theory that the trappean effusions (or at least the earlier series of them) preceded the upheaval of the Ghauts:—

Theory of Laterite formation.

The upheaval of that range of which Mahableshwar is a part, and where trap is seen interstratified with laterite, was coeval with that of those primitive and granitic mountains which continue in extension from the trappean limits to Cape Comorin.

2. Those primitive schists and granite underlie the trap and laterite formation to an unknown extent.

3. Laterite is an aqueo-tertiary, and trap both a secondary and tertiary volcanic product derived from those schists, before their upheavals, and deposited under water. Hornblende schist being rich in iron mould, explains the presence in laterite of that metal.

Water.

The Concan is remarkable for the purity and abundance of its water,—points of great importance to the Hindoo, and which recompenses him for the privations he must be subjected to from so unproductive a soil. The whole country is intersected with rivulets and water-courses, and natural springs are met with in almost every hollow.

Vegetable Products.

The alluvium in the valleys, and that bordering the creeks and rivers, yield rice, and the sandy alluvium of the sea-shore cocoanuts in abundance. The rice is coarse and poor, inferior to that brought from Bombay; it is, however, cheaper by two pylees the Rupee. Vegetables are grown in the monsoon, but not in any quantity; they are mostly of the cucurbitaceous description, viz. gourds, pumpkins, tainlies, karailies (Momordica charantia), cucumbers, toorais (Luffa), and snake-gourd (Trichosanthes anguina), also the bendy or esculent hibiscus, radishes, bhajee (or country spinach, a species of amaranth), beans of two or three kinds (bouchie, chowlee, ullsoonda, gaora), brinjals, maize, also yams, and the sweet potatoe —these not always procurable. What little sugar-cane is raised in a few favoured localities is for the most part sold to Banians from Bombay, or converted into goor for home consumption; consumed also are the tubers which grow in the axils of the dioscorea bulbifera, and the stems and roots of the aloo (Caladium esculentum). A favourite vegetable are the pods of the mooringa tree, the scraped bark of which we call country horse-radish, and use as a substitute for that esculent; green coriander and fenugreek for chutney, and pawn leaves, are also sold in the Bazaar. The fruits are mango, jack-fruit, cashew-nuts and its fleshy receptacles, jamb (which is pear-shaped, and tastes like apples), pine-apple, betelnut, plantains (mostly coarse), limes and a sour orange (probably from having been grafted on a sour lime stock instead of a sweet one), custard-apples and melons, besides jambuls, corundas, and other wild fruits; green ginger, chillies, and turmeric in small quantities; but onions, garlic, coriander, &c. are imported from Bombay or the Deccan. Cocoanut oil is made here, but not in sufficient quantity for exportation, as also pfenny, a

country spirit, consumed on the spot, and which sells at 4 annas a bottle. Tamarind is gathered in the fine weather and pickled in salt; also kokum, the fruit of the wild mangosteen (Garcinia purpurea), growing abundantly in this part of the Concan, and used like tamarind. At Malwan they extract a concrete oil from the seeds by pounding them to a flour, boiling in water, and then skimming off the oil as it rises to the surface. It is said to be beneficial in sunburns, excoriations, heat of skin, and chapped hands, but it is used also for cooking. It is met with in the shops in rounded lumps of two or three pounds weight.

Kokum.

The staple cereal of the slopes is naglee or natchnee (Eleusine coracana). It is not so nutritious as bajaree, and a Guzerathi or Deccanee man unaccustomed to it finds it windy and indigestible; it is very much cheaper than bajaree, which is imported. Wuriaee and khajon are small millets (Panicum), and command the same prices as naglee; hureek (Paspalum), a small red seed, not always found in the Bazaar, and grown on the poorest land, is cheaper still, and consumed only by the poorest biggaries. Wheat, gram, and toor all come from Bombay or the Deccan, and are dear; but a cheaper pulse grown in the country is ooreed (Phaseolus mungo), also kooltie (Dolichos uniflorus) and chowlie (D. simensis). The grain brought from the Deccan comes on the backs of pack bullocks, and the Brinjaries take back salt and cocoanuts.

Grains.

Nux vomica seeds are abundant, and a basketful may be obtained for a few pice. Squills grow in profusion on the sea-shore, but whether fit for medicinal purposes I am unable to say; sweet oil plants seem to thrive on the poorest land; two sorts are raised, both called *til*, one with a yellow composite flower not unlike arnica (Verbesina sativa), the other is the true sesamum, of which there are two varieties, —a smaller white, and a larger uncultivated purple one, both with the well known ringent corolla, reminding one of foxglove. The best and clearest oil is from the white sesamum. Its seeds are round; those of the other plant are rather longer. There

Nux Vomica and Squills.

Oil Seeds.

is also a bitter oil called oondenee, made from the seeds of the Calophyllum inophyllum; they are gathered in the hot weather, and dried in the sun. The tree is handsome and umbrageous, growing luxuriantly in the valleys; the oil is used only for burning.

Castor oil comes from Bombay, and is dear. The only fibrous plant cultivated is the taar, and is grown by the fishermen for their nets. It has a yellow papibonacious flower like that of furze or broom, and is better known perhaps as sunn (Crotalaria juncea). The ambaree hibiscus is seen only in gardens, and its leaves are eaten as a vegetable. Taar is sown in June, and reaped in October, when in flower; it is pulled by the roots and dried in the sun; when required for use, the stems are soaked seven days in water. They spin their own thread, and the nets when made are steeped in a strong bark ley, which preserves them from the salt water; this process is repeated every fortnight while in use. A bark externally black, but red inside, is used for tanning hides; it is derived from the aine, a species of terminalia. The bark fibre from the stem of the soorma palue answers for fishing lines. These fibres are a foot and a half or more long, and are tied together with a true fisherman's knot, and are as strong as the best salmon-gut. The leaves of the palue are pinnate, the fronds small and triangular, inflorescence monœcious, fruit in pendant clusters.

Fibrous Plants, Taar, &c.

A rope is made of plaintain fibre for domestic purposes, tying up cattle, &c.; and I have seen bundles of fibre prepared from the aloe and pine-apple, but I believe these plants are not much availed of. Among the vegetable productions of this station may be mentioned the East India arrowroot, of which a considerable quantity is made annually in the Jail. It is called Kutcherra by the natives. The plant is a species of curcuma. The arrowroot is obtained by macerating the tuber-like corn in water, and by repeatedly washing it to remove its inherent bitter principle. Tapioca is also grown and manufactured in the Jail. The true maranta is cultivated by Mr. Trott, the Deputy Collector, in his grounds with great success.

Arrowroot.

An edible Orchid.

I must not omit to notice the existence at Rutnagherry of a terrestrial orchid, from which I am persuaded salep may be obtained. The flower is white, with a single leaf pressed close to the ground. It appears in June.

Sedge, &c.

A silky substance is obtained in the jungles, being the produce of a bombax tree, and for quilts and mattresses is not a bad substitute for cotton. A sedge grows in the salt-water creeks, from which excellent matting is made in the Jail, which is also noted for its strong towelling and fancy cane-work. Wood for building and shipping purposes comes from a distance, and is very dear. Bamboo is abundant, but not so cheap as might be expected.

Vegetation generally.

The character of a climate may be judged, it is said, by that of its indigenous flora, and though the general appearance of the country about Rutnagherry is in this respect singularly barren, from its rocky nature, nevertheless vegetation is by no means scant in certain localities. The town itself is buried among trees, consisting for the most part of areca and cocoanut. Mangoes, jack, peepul, bamboo, and the purple garcinia, rows of Indian fig trees, ornament the cantonment above; and in the valleys, especially about the neighbourhood of the villages, may be seen the tamarind and bitter oil tree. Admitting, however, that all these may have been planted, we shall find screwpines growing on the sea-shore, and the salt-water creeks fringed with mangroves and the sea holly. The hill sides abound in a shrub of jungle geranium (ixora) and a species of wrightia, interspersed with terminalia and the strychnos nux vomica; several euphorbias are used for forming enclosures, while the commonest weed in our compounds is a humble member perhaps of that unattractive family. In the rainy season almost every third plant is leguminous; acanthads are also numerous: others trailing over rocks and bushes are coculi and wild yams, cucurbits, vines, asclepiads and bind weeds of different colours. In shady hollows, intermingled with a rank undergrowth of curcumas, leeas, taccads, and aroids, are seen the splendid flowers of the costus speciosus and gloriosa superba; and

in the dampest recesses of ravines ferns flourish on the mossy banks with the balsams and begonias, the curious biophytum, and still stranger æginetia. At this season too the black 'kartel' assumes a lively hue, for wherever the soil accumulates to the depth of an inch or so, butterworts, lilies, and pipeworts spring up in crowds, and impart a variegated appearance to the plains; while squills cover the sea sands with their green leaves, relieved by the purple flowers of the goatsfoot convolvulus.

Animal Products.

The principal animal product is of course fish, of which a considerable quantity finds its way inland and up the passes of the Ghauts into the Deccan. It is very imperfectly cured and salted, being often merely soaked in a briny mud, and dried in the sun. Sardines swarm on the Coast at certain seasons, and are used as manure. Many sharks are taken, and their fins and tails cut off, dried, and exported to Bombay. Wax-candles are made by an enterprising Indo-Portuguese, who obtains the wax from Bombay, bleaches it, and re-exports it manufactured.

Edible Birds' Nests.

Edible birds' nests are found on an island a few miles down the Coast at Malwan. I am indebted to a friend for the following particulars:—the birds leave "before sunrise, and return after sunset; they come and go in thousands; they are of the swallow tribe; the rocks are about six miles from the Coast, and are farmed out to the Goanese for Rs. 500 a year; the birds build in a long and lofty cone, perforated above." The Goanese probably find their account in these birds' nests, by exporting them to Macao.

Ghee, &c.

Ghee in small quantities is brought in from the districts about Sungumeshwur, but it is chiefly imported from Bombay. The Bazaar price is four to six seers the Rupee, according to quality. Turtles are now and then taken on the Coast, and their eggs found in the sands. Oysters, prawns, and crayfish are also abundant; the former, eaten in excess, have been known to produce symptoms not unlike cholera. Cockles, lingulæ, and other bivalves, are found in the fish market sometimes, and occasion those unaccustomed to their use sickness and an eruption like articaria. Lime for cement is

made from the shells of veneridæ, the mollusk being used for bait, and very generally consumed by the poor. Baskets full of a species of *arca* are sold in the Bazaar for preparing the fine lime used with pawn soparee. Bison are numerous inland, towards the Ghauts on the Warree frontier. From the hides of buffaloes are made excellent travelling trunks, light, portable, and impervious; and ornamental articles are carved and polished from the horns of the bison. Pullets find, as well as saltfish, a profitable market in Bombay.

Leeches.

Leeches are obtained from Hurnee and Vingorla, and are procurable only from one party, who is attached in the capacity of leechman to the Hospital establishment.

Zoology generally.

The wild animals of the neighbourhood are foxes and jackals, a spotted civet and a larger perfectly black species; both haunt the roofs of dwelling-houses. This last animal is plantigrade, and has a thick bushy tail, tapering to a point. The mongoose, scaly ant-eater (Manispentadactyla), musk-rat, bandicoot, domestic rats and mice, the brown field-mouse (eaten by the Kathkurries, a lowcaste people), hares (scarce), the jungle cat, sea-otters in the creeks, the large grey ape, a small kind of deer called bekrie; porcupine, bats of kinds, including the flying-fox and the common striped squirrel, black bears, tigers, sambur, deer, and bison are found in the jungles at the slopes and at the foot of the Ghauts, especially towards the Warree frontier, also panthers, hyenas, and wild boar, and these are occasionally heard of as having been seen in the immediate neighbourhood. Of birds are common the vulture, white kite and Brahmini kite, a large brown hawk, and another brownish with a speckled breast, yellow bill and legs, a white hawk with reddish-brown back and wings (a great enemy to snakes), blue or hunting hawk, and two kinds of sparrow hawks, crows and the blue-winged jay, the large horned owl and the screech owl, the common black shrike and two other kinds resembling lamus collurio and lamus rufus, the black and white fly-catcher, and the green fly-catcher, the mango bird, the brown and grey minars, the dirt bird, the rose starling (appearing in

flocks in the cold weather, and disappearing in April), the crested lark and a pipit, the black-breasted ortolan, the large black and white robin, the lesser black robin, two kinds of red starts (one large, black, with bluish reflection), the common bulbul and a variety with whitish breast, the tailor bird, two small birds allied to the honey-sucker tribe, a small bird resembling the cole tit-mouse, three wagtails (black, pied, and yellow), four or five kinds of martens and swallows, the goatsucker, the hanging birds' nest, bunting, a green finch, the common sparrow (a large colony of them at the Jail), hoopoes, a small green and copper king-fisher, and one with white and black plumage, a woodpecker also white and black with crimson tuft, the little green woodpecker or coppersmith, the cona, green parrots, the red or button quail, blue pigeon, green pigeon, and two or three kinds of dove, plovers of five or six kinds, the oyster-catcher, the large and the lesser curlew, sandpipers and sanderlings; cranes, white and grey, paddy birds, snipes and the painted snipe, wild fowl of ordinary kinds; a water rail. Of gulls only one kind is observed, which occasionally appear when the sardines swarm on the Coast. In addition to the above there are others of rarer occurrence, the hornbill (buceros), the rain bird, three-toed quail (rare), a smaller kind of parrot (head of a dull crimson colour), sedge warblers, and a few others of the passerine kind, which haunt more secluded parts, including two other varieties of bul-bul, with long bird-of-paradise-like feathers, white in the one sort, and reddish-brown in the other; the rock grouse, a medium-sized white and brown owl, the blue and red kingfisher, and a small bird of the habits and appearance of a goldfinch, &c. Of these some are birds of passage. Of reptiles, there are land tortoises, lizards of three or four kinds, and snakes in large, numbers; of venomous kinds the commonest is the phoorsa, less common the cobra, the kandar, and the gonus (a rock-snake). The green whip-snake is also said to be venomous, but it has no fangs; and rarer the carpet-snake. Non-venomous kinds are the dumman, which grows to a large size, and is destructive to poultry; the gonus (also so called), a kind of blind worm (anguis), attains a considerable size; the munniar, a

fresh water snake, black above, with copper reflections on the under side; a black snake perfectly white underneath, one of light brown (called naguin), and another brown with longitudinal stripes. Food for these reptiles are frogs and toads, which swarm also in the rainy season. Of fishes sold in the Bazaar, the best are pomphlet, black and white, the pulla fish, soormai or seer fish, rāmus, sardine, geder (a fish with dark meat), and baugra (a kind of mackerel); the bummuloe is very rarely taken; soles and grey mullet. Other kinds are rock-fish, snappers, singalla, gourd fish, sand fish, &c. abundant and cheap, in fact with the Native all is fish that comes to the net. The insect world is not well represented, but white ants infest the soil, the large yellow ant swarms in the woods, and our domiciles are overrun with the black ant. The moth tribe and the genus "Cimex" are tolerably abundant; also a blister beetle. Honey bees are of the smallest kind, and of wasps only one sort is extant, indicating the dearth of fruit and of nectar-bearing flowers; the plague of flies is unknown. The cuttle-fish is common, and the tentacles are used for bait. There are about 100 varieties of testaceous mollusca with serpula and cerripedes of large size, and the sea snail (holothurium), &c. &c.

Mineral Products.

From the geological description of the country above given, no valuable mineral products can be expected from Rutnagherry. The character of the formation changes at no great distance to the Southward towards Rajapore and Malwan. Specular iron glance of great purity exists there, but not in considerable quantity, associated with quartz rock. Iron was formerly smelted in these districts, but wood is now the more valuable commodity of the two; besides iron, formerly manufactured at four pice, is now under-sold by English metal at two. There are beds of magnesian slate (potstone) referrible to the uppermost morphu or lower secondary periods, from which are made bowls, butter-pots, and such like articles. Tiles, water-chatties, and chunam are also brought from the clay-pits of Malwan. Some are made here.

Iron.

Steatile.

Mineral Springs.

Hot-springs are found in several parts of the Southern Concan, and the mineral water has been lately analysed by the Government Analyser, but they are not known to be possessed of any extraordinary medicinal qualities.

State of Agriculture.

The owners of the land are called Khotes; they arrange with the revenue officers for the payment of the ground-rent, pretending to hereditary rights in the matter. They either sublet it to the ryots, or cultivate it on their own account. The Mhars come in for their share of the produce, and the village Gooroo or priest is entitled to his tithe. The Mhars do duty as village watchmen or guides; they are hired also by the Khotes to guard the crops on the ground, and always appear better fed and clothed than the cultivators. Notwithstanding these drawbacks, and the exactions of the Khotes, the ryots cannot be induced to accept the liberal offers of Government made them to settle in Khandeish. In the Concan sufficient grain is not raised for the population; a considerable amount is consequently brought into the country from above the Ghauts, which is partly paid for in cash, and partly bartered in retail dealing for fish and oil. The pensioner's four or five rupees a month spent in grain will fill many mouths, and will account in a great measure for the way in which the imported grain is paid for. The average quantity of land under cultivation may be estimated at about $\frac{3}{10}$ths of the whole capable of tillage, and this amounts to about $\frac{2}{3}$rds of the whole area of the Collectorate; but the soil is so poor in many places, that after it has yielded two or three crops in succession it must lay fallow for several seasons before fit again for the plough. The kind of manure in general use is wood ashes, which is burnt on the ground shortly before the first fall of rain, and ploughed in with it. About the middle of June they sow. The shoots are well up by the end of the month, and by the first week in August the natchnee is in ear; the oil seeds and rice somewhat later. In harvesting the natchnee, the sickle is never used: each ear is carefully gathered by hand, those not ripe being left on the stalk for another fortnight. A second crop of rice is grown on the

alluvium below wherever there is a spring of water to irrigate it; this crop is not transplanted from seedlings, but the grain, first soaked and allowed to germinate, is sown broad-cast in the soft warm mud. This rice is a coarse red kind, called wangene. It is sown early in February, and reaped in May. Cooltee and chowlie are cold weather crops.

Manure.

The system of manuring with wood ashes has led to a wholesale and improvident destruction of the jungle, no provision being made for the future by planting slips to replace in time the trees cut down. Sardines make an excellent manure; and careful cultivators, instead of ploughing them into the land, cut each fish into four parts, and insert two pieces with each plant; the result is an increase in the yield of 50 per cent. This manure is not very expensive: a rupee will buy six maunds; and twenty maunds are sufficient for two beegas of land.

Diseases.

Small-pox and Vaccination.

Of epidemic diseases small-pox is most prevalent in Rutnagherry, and cholera in the districts. The former disease I am persuaded (also very prevalent in the densely populated districts) is kept up and propagated to a very great extent by the practice of inoculation. Admitting even its occasional prophylactic powers, the above circumstance is a sufficient argument for its discouragement. The practice is forbidden by the authorities, and is gradually giving way to the introduction of vaccination. It is satisfactory to observe that within the last three years a very large increase has been effected in the numbers operated on within the range of my limited supervision. One circumstance somewhat detrimental to its reputation and success, though perhaps just at present unavoidable, is the practise of vaccinating during the prevalence of small-pox, the consequences of which are that the lymph becomes deteriorated in quality, and acquires, if I may use the expression, a hybrid character. My grounds for this opinion are, that several reported cases of non-protection have occurred in consequence; and that in other instances ill-conditioned boils or ulcers have been developed at the time of vaccination.

Cholera.

Cholera rages almost every year in some or other of the Concan villages, with more or less severity, These villages are not only situated in the most confined part of the valley it is possible to select, but the houses are small, ill-ventilated, and crowded with inmates. Rutnagherry, from being well open to the sea-breezes, enjoys a *remarkable immunity*. Sporadic cases certainly occur, but during an experience of nearly three years I can record only four cases in the Jail, one in the Police, and none in the Detachment or European community. Lumbricus is very general, not singly,

Worms.

nor in pairs, but passed in large numbers both by man and child. Dracunculus, on the other hand, is never seen here, though known at Chiploon and elsewhere in the interior.

Scabies.

Scabies is a very common complaint, especially on the Coast, and often occasions very aggravated excoriations and ulcerations of the integuments in children; and although my returns may not corroborate the statement, it is well known that syphilis exists to a great extent at Rutnagherry.

Bilious Affections.

Bilious derangement, manifesting itself as intermitting fever or as cholera biliosa, is an endemic of common occurrence, but though intermittent fever is not uncommon among those who live in the lower part of the town, it is not of that obstinate description contracted in the districts, and known as Bankote fever, from its resemblance to the endemic of that unhealthy locality.

The characteristic disease of the SW. monsoon is dysentery.

Affections of the Nervous System.

Disease of the nervous system, manifesting itself in mental alienation or paralytic affection, is another not uncommon result in the Concan of the habitual use of the narcotic drugs already mentioned. The practice of procuring abortion is also common, and mechanical means are principally resorted to, to effect this object.

Snake-bites.

Bites from a venomous little snake called the phoorsa are very frequent, and many deaths are said to occur from this cause in the interior.

This snake is of a reddish-brown colour, like the soil, with diamond-shaped markings of a dirty ochre on the back, spotted on the sides like a trout, the belly blueish. One that I examined had besides a full fang, another old one, loose and discoloured anteriorly, and posteriorly a new one coming on; the tubular canal in the centre of the fang was seen with the aid of a microscope. A peculiarity in the eye was its yellow iris and elongated pupil, contracting linearly like that of a feline animal. The snake is not more than a foot in length, often much shorter, is ordinarily slow in its movements. The effects of the poison are manifested upon the blood, the vitality of which it seems to destroy. Blood oozes from the pores of the skin, from the gums, and from under the nails. I cannot confirm this statement by my own experience, but the story has been told to me so frequently that I see no reason to doubt the truth. A case that I met with in the Hospital records, states that there was great oppression at the chest, and the bleeding from leeches that had been applied could not be stopped. The symptoms I have observed are local œdema, continuing several days, succeeded by an ill-conditioned ulcer with fungoid growths, and a scanty sanious discharge. The Natives believe in the efficacy of charms, and in the application of fowls' vents, in relays, to the bitten part.

Diseases of Cattle, &c.

The prisoners are sometimes subject to scurvy; otherwise the Jail is a very healthy one. This disease presents symptoms somewhat differing from those characteristic of sea scurvy. They are painful swelling and induration of the integuments of the lower extremities, puffiness of the face and œdema of the feet, the small weak pulse and white lips and conjunctiva of anœmia, extreme languor and los of appetite; sponginess of the gums is also present, but no ulcers unless pre-existing, and but rarely complicated with dysentery. Cattle are affected with dysentery, attributed to an ulcerated condition of the intestines. It is said they are more often afflicted with this complaint when small-pox breaks out among men, but I could not learn that pustules were ever observed about the udder and teats. The natives use for this complaint the seed-pods of the wild balsam; it has a sharp acrid taste, some-

what astringent, and leaving for some time an after-feeling of heat upon the lips and tongue. Another disease with which animals are affected in these parts is a kind of staggers, accompanied with staring hide, swelled belly, and emaciation. This is observed in the hot weather. A formidable complaint is a swelling of the tongue and maxillary glands, difficult deglutition, and heat and dryness of the æsophagus; this is treated by scoring with the actual cautery. Colic and rheumatic affections of the joints, to which they are very liable in the rains, is also treated with the hot iron. In the rains also they are sometimes suddenly attacked with paralysis of the lower extremities (called kuksh wayo). They are often bitten in the tongue and lips by the phoorsa snake. Goats, singularly enough, are not affected by the poison of this venomous little asp, but are sometimes killed by the sting of a scorpion. Goats thrive at all seasons, when cattle may be literally starving. Sheep soon waste away for want of green fodder; and in the rains they contract rot in the hoofs.

Diseases of Plants.

Rice in the ear is sometimes attacked by a fungoid disease, which converts the grain into a sooty powder, or blackens it. This is apt to occur when the rain about the end of August continues of the same heavy character as of the earlier month, instead of being light and showery. Another disease is a dry rot or withering of the young plants when a foot or so high. This happens in the early part of the monsoon, and is attributed to high and stormy winds. Natchnee is mostly attacked by caterpillars in the green state: field-rats sometimes do damage to the dry crops, but not to that extent complained of elsewhere.

Domestic poultry are infested at times in the hot weather by fleas of a very minute species, and which fasten into the cuticle of a human being even with extraordinary tenacity, and are with difficulty dislodged. The poor animals scratch themselves to death. The best remedy is an ointment of oil and turmeric. Turkeys are subject to a pustular disease when young, which appears about the head and wattles, often destroying them, or they may die suddenly of apoplexy.

Roads and Communication.

With the exception of six or seven miles leading in the direction of the Amba Ghaut, and a pleasant drive of three or four more at the station, there is no road leading out of Rutnagherry by which easy communication can be held with other parts of the country.

The country footpaths, winding over hill and valley, interspersed with broad flights of stone steps half a mile or more long, are available only for pedestrians, the pack-bullock, or tattoo, but, as already stated, Rutnagherry during the fine weather is easily approached by sea, and shipping is always readily procurable at Hurnee or Vingorla. Nevertheless there is nothing to prevent the march of infantry upon Rutnagherry, by any of the passes of the Ghauts; their baggage being sent by those most accessible to the sea-coast. The principal passes leading into the Rutnagherry Collectorate are :—

1. The Par Ghaut, leading to Mhar and the Bancoot river; good, but too steep for carts.

2. The Cuncowlie Ghaut, from Kher to the Anjunwell Creek; very steep.

3. The Teoora and Sewree passes; the latter much used by pack-bullocks; the former a tolerable bridle-path.

4. The Koombarla Ghaut from Chiploon, running first South, and leading thence Northwards to Sattara and Southwards to Kunar, communicating with the sea by the Anjunwell Creek; in course of construction, and will be available for carts.

5. Teoora Pass No. 2.

6. Mullah Ghaut, leading from Puttunkurrar and Kolapore, to Sungumeshwur and the Zyghur Creek; steep.

7. The Amba Ghaut, leading direct to Rutnagherry from Kolapore; accessible to pack-bullocks and tattoos.

8. Veeshalghur Ghaut, leads from Kolapore to Lange, and to the Rutnagherry Creek; very steep, and little used.

9. Unooskoora Ghaut, leads from Kolapore to Rajapoor and the Eshwuntghur Creeks; enjoys much traffic; used by pack-bullocks.

10. Kudjurda, leads to the same points, also to Waghotun

and the Viziadroog Creek ; pronounced by Colonel Kilner as the easiest for making a road ; little used.

11. Phoonda Ghaut, from Kolapore and Belgaum, direct for Rajapoor, Waghotun, and Malwan; in course of construction; will be available for carriages, having an easy gradient of one in twenty-five at Viziadroog; large steamers can anchor close inland.

12. The " Goontgher," direct to Malwan from the Southern provinces ; enjoys at present more traffic than the Phoonda (there is no creek at Malwan, but good anchorage; inaccessible for carts).

13. The Parpoolie, leads to Warree (the works formerly carried on have been discontinued) ; at present little used.

14. The Ram Ghaut, direct from Belgaum to Vingorla ; very steep, though available for carts with extra pair of strong bullocks attached.

All these passes, with the exception of Nos. 4, 11, and 14, can be only used by pack animals lightly laden. The road of the Par Ghaut is good, but too steep for draught cattle.

The Phoonda Ghaut when finished, leading as it does to the most convenient anchorage of the Waghotun or Viziadroog Creek, will soon supersede the Ram Ghaut as a military road.

Barracks or Lines.

The lines for the accommodation of the detachment of Native troops are built in parallel rows, two of which (the centre ones) are of hewn stone and tiled, but the others are in a very dilapidated condition, and have lately been condemned by a committee of military officers. They are built of mud and unhewn stones, and were constructed as far back as the year 1827. They are fast falling to ruin ; and the foundations being undermined by the ravages of rats and bandicoots, it is probable that they will not stand together much longer. The water-supply is obtained from the spring before alluded to, also from wells in the neighbourhood. The lines are eligibly situated in respect of soil, which is stony, to the Southward. They are well open to the sea-breezes, but at the same time exposed to the whole force of the South West monsoon. The rain runs off naturally. The roofs are all small

and low, ill-ventilated, as native huts generally are, with a single doorway. The only place of confinement is the quarter-guard, in front of the lines. Their general aspect, but for their ruined condition, would be clean and airy, and there is a patch of turf in front, which serves for roll-call and parade.

Civil Hospital.

The Hospital faces the North West. It contains one ward, 85 feet in length and 19 in breadth ; it is well ventilated. The Hospital is well built, the floor earthen, but the walls stone ; and the roof tiled ; the floor is raised about two feet from the ground ; it can accommodate 40 patients without crowding them. It is distant about five minutes' walk from the lines, and is enclosed in a compound, which is available for convalescents. There are two small rooms twelve feet in length, walled off from the main ward (with separate entrances) for other purposes ; and the Surgery is a similar small apartment at the other extremity ; the cooking places, &c. are in the rear, and a covered passage leads to them. The Surgery is also used as a store-room. No particular disease has ever been traced either to the Hospital or to the quarter-guard when used as a place of confinement. Charpoys are available for the sick, and warm drawers and banians for those requiring them. The cooking places are in a serviceable condition, but the necessary should have a wall or bamboo fence erected in front ;* the ceiling of the Surgery might be made pucka, and glass panes substituted for split oyster shells, as on dark rainy days it is impossible to see distinctly when the frames are closed.

* Has been effected.

III.—TOPOGRAPHY OF SATTARA.*

By C. J. WIEHE, M.D., Civil Surgeon,

and J. E. BATHO, Esq., Surgeon 26th Regt. N. I.

Situation, Boundary, &c.

The station of Sattara stands in lat. 17° 40″ N. and 74° 2″ E. on an elevated plateau 2,320 feet above the sea level. It is 75 miles South from Poona, (with which it communicates by an excellent first-class road,) and an equal distance from Kolapoor, to the South. The military stations of Sholapoor and Dapoolee are respectively due East and West of it, the former 130 miles distant, the latter 64.

The cantonment is situated on a rising ground, midway between the native town and river Yenna, about a mile from each, and inclines towards the river by a gentle slope.

The Talooka of Sattara (in which it is situated somewhat centrally) is in the form of an irregular quadrangle, surrounded on its four sides by the Talookas of Waee, Roregaum, Targaom, and Jowlee; its natural boundaries being a low range of hills to the North, the river Kristna to the East, the Oormurree, an affluent of the Kristna, and low hills to the South, the Western Ghauts to the West.

It is traversed by first-class roads to Poona and to Mahableshwur; by way of the latter (*viâ* Mharr) communication is maintained with the Coast.

Roads, mode of Communication.

In the other directions above mentioned, first-class roads extend only to a short distance beyond the cantonment, being continued by third-class roads (cleared tracks), and generally without bridges. During the prevalence of heavy rains, transit is rendered both difficult and precarious.

* For fuller information on the climate and diseases of Sattara by the late Dr. Murray, *see vols.* ii. & ix. *Old Series.*

Prevailing Winds.

The prevailing wind in the early months of the year is Easterly during the morning, veering round by the N. to W. in the after part of the day; in the succeeding months of the hot season it blows steadily from the W., commencing generally about mid-day, and blowing till a late hour in the evening; the nights and mornings are calm and cool. NW. and SW. winds are prevalent during the monsoon; N. and NE. during the rest of the year.

Mountains.

The hills in the neighbourhood form striking objects in the landscape from their boldness, and variety in shape and colour; they environ the cantonment on the N., S., and W. aspects, in distances varying from two to eight or nine miles; they are disposed in chains, and are offsets from the Western Ghauts. Several, which attain a superior altitude, have received particular names; as the Hill Fort, Euteshwur, Jurrendhur, Nundghuree, Wundun, and Chundun. The heights of these may be stated approximatively as from 1,000 to 1,300 feet above the level of the plain; the forms most general are the table-shaped and the hog's back.

Hill Fort and Euteshwur as Sanataria.

The Hill Fort and Euteshwur, from their proximity to the station, their flat and tolerably extensive surfaces, and the facility with which access may be had to them, may be considered as affording eligible places for the formation of sanataria.

The first is situated a little to the SW. of the station, the native town being built at its foot, on the Northern aspect; it is about 800 feet high, and is ascended by a pathway a little beyond the town, and a mile and a half from the cantonment. This, for the first half of the ascent, is well made, and of tolerable width, but dwindles afterwards to a narrow track, which is often washed away in parts by torrents from above.

The summit of the hill, which is $1\frac{1}{2}$ mile in circumference, and of an irregular triangular form, is entirely surrounded by a wall of solid masonry, now in ruins, and the rock is deeply scarped.

The old palace, a substantial and capacious edifice, is situated about the centre, facing N. and S. With the exception of a small house on the wall, it is the only habitable building now

remaining, the other palace, somewhat larger than the present one, having been pulled down last year on account of its insecurity. A limited number of convalescents might be accommodated on the upper story of the present building, the lower one would require alteration to render it habitable for Europeans.

There are several tanks in the vicinity of the palace, which afford an abundant supply of water throughout the year, and a few large trees at the NE. angle of the Fort.

The soil is rocky, with small quantities of alluvium in the hollows; the climate is cool and agreeable, for though not entirely out of range of the hot-winds in April and May, the temperature is so much lower than in the plains as to render it a desirable place of resort for invalids.

Euteshwur is situated a little to the NW. of the Fort, (to which it is connected by a low ridge), and sub-tends with it a considerable angle, in which are situated the outskirts of the town and lines of the local regiment. It is approached by a well-made road of easy ascent, cut out of the North face of the mountain till near the summit, when it becomes suddenly steep and winding. It is about 300 feet higher than the Fort, and more extensive and irregular in figure.

Several of the European residents at Sattara have built houses and formed gardens here, but except in the hollows, where a few trees grow, (chiefly bamboo and mango,) the surface is stony, and soil requires to be imported from a distance.

From its superior elevation, it is less exposed than the Fort to the hot-winds, and the climate throughout the year is by some considered not inferior to that of Mahableshwur. It commands an extensive view of the surrounding country, but the spot itself is too confined and monotonous in appearance to allow any comparison except in point of temperature.

Seas, Rivers, &c.

The station of Sattara is distant in a direct line about 60 miles from the sea, the nearest ports being Chiploon and Mharr, each situated on a creek.

The only rivers that belong in part to this talooka are the Yenna and the Kristna. Both take their rise in the Mahablesh-

wur range, and run a somewhat parallel course in a SE. direction, as far as Mahooly, a small Brahmin village two miles due E. of the cantonment, where the first named loses its independent existence, and falls into the Kristna.

The latter river has its source at the village of Mahableshwur, in 18° N. lat., and runs in the SSE. direction as far as 16° 30″ N., when it turns SE.; and after a tortuous course across the continent falls into the Bay of Bengal at 10° N.

Tanks.

There are no lakes in the neighbourhood, but two tanks have been formed within a few years by embankments thrown across nullahs, near the Residency, from one of which it is proposed to supply the cantonment with water by means of pipes, as the supply from the wells is sometimes deficient in quantity and bad in quality towards the conclusion of the hot season, and the water in the sepoys' lines rather brackish.

Wells.

The wells are eight in number, constructed of stone, with parapets, and faced with brick; four are contiguous to the large nullah which runs through the camp; two are in the sepoys' lines, one being allotted to each wing of the regiment; two in the Sudr Bazaar, and two between it and the Poona road. In addition there are two large wells of excellent water immediately beyond the camp limits, to which recourse has been generally had hitherto when water has run low in the camp.

Drainage.

The cantonment is well drained by the deep natural nullah above mentioned; to this converge from various parts the smaller water-courses and artificial drains; and as the land slopes down to the river, the water is quickly carried off after heavy rains, the lighter showers are absorbed by the coarse and porous substratum formed by debris of the trap rock.

Climate.

The temperature during the early part of the year is cool and invigorating, but from the fact that the prevailing wind is from the East, and causes a sensation of dryness and constriction of the skin, it is not generally considered congenial to the feelings. Towards the end

of February it becomes perceptibly warmer, and by the middle of March the hot season may be said to have commenced. About this time it is usual to close doors and windows to exclude the hot wind, which now begins to blow strongly from the West. The heat continues to increase gradually, and attains its maximum about the middle of May, when it is not unusual for storms to occur, with sensible abatement of the intense heat of the two preceding months. In the absence of these, the weather often continues extremely sultry till the end of the first week in June. After sunset, the air soon becomes cool, and the nights seldom without an agreeable freshness from the sea-breeze, which does not lull till early in the morning. At the hottest period of the year the mercury at 6 A. M. has never been observed in the house of the writer higher than 83°, nor to exceed 86° at 6 P. M. with the house closed; but on opening the doors it has risen 2°. From this diurnal alternation of cool nights with hot days the heat is less intolerable than at some other stations, where the temperature is lower, but more damp, and the nights less fresh.

The climate of the monsoon is peculiarly soft and agreeable; no great amount of rain falls in June, but as heavy clouds are prevalent, with occasional showers, a diminished temperature begins to be perceptible after the first ten or twelve days, which continues throughout July, on the setting in of the regular monsoon, which, here as elsewhere, commences with violent storms of thunder and lightning.

It is in July by far the largest proportion of rain falls; August is often dry; and light drizzling showers at intervals, till late in the year, are not infrequent. Heavy rain from the East—"the Madras monsoon"—occurs towards the end of September and at the beginning of October, on the cessation of which the temperature is generally hot and close for about a month, when November ushers in the cold weather, which lasts till the end of January.

It may be stated, on the whole, that the seasons at Sattara exhibit a considerable uniformity throughout the year, and are not subject to abrupt changes of temperature, or to extremes of heat or cold; and though, from its elevation, the comparative absence of water, and the character of the surrounding country,

which is bare of trees, the atmosphere during the fair season is rarefied, dry, and exciting, still, from its proximity to the Coast, these qualities are less remarkable than at other stations of the Deccan of less altitude, but removed further inland.

In a medical point of view, it offers a decided change to the moist and relaxing atmosphere of the Concan.

It is most suited to the nervous, the simply debilitated, and the relaxed, to the dyspeptic, and those affected with chronic bronchitis, and greatly increased secretion; but it is liable to aggravate, or render more acute, hepatic and cephalic derangements, by constricting the vessels on the external surface, and determining an increased flow of blood to the internal viscera, thereby occasioning congestion and obstruction of these organs, which have been weakened by previous disease, or the influence of climate.

These adverse conditions, however, are limited to the dry season, or at least are considerably modified by the monsoon, which is soft, mild, and humid. This season appears particularly suited to the European constitution: during its continuance severe disorders are infrequent, the prevailing complaints being slight fevers, and functional derangements of the thoracic and abdominal viscera.

Rheumatic and neuralgic affections are very common and obstinate amongst the natives, but Europeans are comparatively little subject to them.

After the first burst of the monsoon, rain falls, for the most part, in moderate quantity (the annual average for the last five years has been 33 inches), and in the form of frequent light showers, which render the atmosphere cool and fresh, without preventing (except occasionally) the necessary out-of-door exercise.

State of Thermometer.

During the last four years the following has been the average maximum, minimum, and medium state of the thermometer, as registered in the Regimental Hospital:—

Maximum temperature	.....	..	88°7
Minimum	do.	.....	69°8
Medium	do.	.....	79°6

The Soil, &c.

The general nature of the soil in the immediate neighbourhood of the town and cantonment is very light and friable, composed for the most part of disintegrated trap, derived from the surrounding hills, mixed with a small portion of alluvial soil.

The Residency and civil lines are situated somewhat higher than the cantonment, but the station generally may be said to be about 2,320 feet above the level of the sea, and 2,000 feet above the line of the Kristna and Yenna rivers. This elevation, together with the peculiar absorbing properties of the soil, render the town and station at all times very dry.

Cultivation not being permitted within the military cantonment, and there being little irrigation, and no jungle within the vicinity of the town of Sattara, the station is remarkably free from noxious exhalations, but when they do arise, it is generally after an unusual overflow of the rivers above mentioned, and are observed to be most deleterious in the months of September and October, or at that period when the water having entirely subsided, leaves tracts of land still moist, and exposed to the evaporation of a powerful sun.

Vegetable Productions.

The vegetable productions obtainable in the Bazaars are numerous, and may be classed under four principal heads, viz. the medicinal, the fibrous, the cereal, and the oil-producing plants.

Medical Plants.

Of the medicinal, there is said to be sixty-nine plants, procurable in a dried state. They are considered by the Wydas or native practitioners more or less efficacious in the treatment of disease, but with exception of opium, colocynth, nux vomica, and chyrata, few of them are officinal, and little or no information can be given as to their true value as therapeutic agents; a great many no doubt are inert, or altogether wanting in the medicinal virtues ascribed to them.

The fibrous plants are 7 in number, but of these two only are cultivated for their fibre-producing qualities, viz. the umbadee (Hibiscus cannabinus), and the ghagul (Agara vivapara), or wild pine-apple. Hemp and flax, the two most valuable of our

vegetable fibres, are not used in this country in the manufacture of rope, which is somewhat remarkable, considering that the fibre both of the hibiscus and ghagul make, after all, but indifferent cordage, their texture being soft, and, when either damp or wet, very apt to rot.

The hemp is cultivated in this country for its intoxicating properties. To the natives of the East and the tropics it has been long known to possess this property, but its medicinal qualities were first investigated by Dr. O'Shaughnessy so late as 1838.

The Indian hemp differs from that obtained in Europe by containing a resinous secretion called in Mahratta churrus. The dried plant which has flowered, and before the resin has been extracted, is called ganjah.

The flax is grown principally for the sake of the oil expressed from the seed (linseed oil); large quantities of the seed are also bought up for exportation.

Oil-producing Plants.

The oil-producing plants known, and to some extent used, in the Sattara districts are 17 in number. Of these several are worthy of particular mention, as possessing either medical properties, or sold as articles of commerce.

Karang (Dabburgia arboria) is much used, and highly prized by natives in the treatment of itch. They consider the oil quite a specific for the complaint. When expressed, it is of a light amber color, and has a rank, disagreeable odour. It is only used as an external application.

The Sesamum orientale, or teel plant, is much cultivated, and used by natives, both as an article of food, and for domestic purposes.

From the kurdee (Carthamus tinctorious) is obtained the native red dye called koossomb, so extensively used by dyers in many parts of Western India. The colour is derived from the flower of the plant.

Another plant which deserves mention is the physic-nut-tree (Jatropha curcus), as it is the oil of this plant, boiled with oxide of iron, which forms the well known Chinese varnish.

The last that need be mentioned is the neem (Melia azadracta). The oil of this plant is used to preserve wood from the ravages of worms or dry-rot, and said by native carpenters to be very efficacious.

Cereal Productions.

The principal cereal productions of the Sattara territory are eleven in number. The principal are wheat, rice, jowarree, and bajree. Rice, requiring much moisture, is chiefly cultivated above the Ghauts; wheat, of which there are two kinds, is grown more or less over the whole province; jowarree and bajree are to be found principally in the South Eastern districts, or in those parts where the black soil most abounds.

Animal Productions.

Animal products there are none, with exception of hides and horns, sold in the Bazaar for the purpose of being manufactured into horn ornaments by native artificers, and for exportation.

Mineral Productions.

The district of Sattara, from its geological formation, is not one in which we may expect to find mineral productions, iron being the only one of which we have any certain information, or which is known and worked by the natives.

It is found in the form of ironstone, principally on the Seyadree range of hills, near Mahableshwur, where from the circumstance of there being abundance of wood for charcoal, it is smelted.

State of Agriculture.

The state of agriculture is here, as in almost all parts of India, in a rude and imperfect state.

Roads, and Communications.

Within the last two or three years great progress has been made in the formation of roads in this province. Four lines connecting Sattara with other military stations need be mentioned.

The principal line of road is from this station to Poona: the distance is 75 miles, and has been made for some years. It is what is termed a "first-class road," being well metalled, and bridged throughout.

The Kolhapore road, when finished, will be of some importance, as connecting with this the stations of Belgaum and Dharwar,

and thus forming a continuous line to Bombay, of more than 400 miles in length.

The road to Sholapore is, at present, only a "second-class" one; when bridged and properly metalled, it will become of great utility, not only in a military point of view, but as connecting Pundurpoor and the NE. districts with Sattara, and thus effecting an outlet for the manufactured and cereal productions of those parts.

The last road that need be mentioned is one leading to Mahableshwur, 30 miles in length. It is not only used by travellers proceeding to the Mahableshwur hills, but is also one on which there is much traffic, merchandise being sent from the NE. districts and Madras provinces, to the port of Mharr in the Concan, by this route.

Diseases.

There are no diseases peculiar to this station, or that are not met with in other parts of India.

Cholera sometimes appears as an epidemic, particularly at the commencement of the monsoon. In the years 1844-45-46 it was very prevalent, and in the months of June and July of 1845 the mortality in the town alone was estimated at 1,000 persons. It again made its appearance at the approach of last monsoon. The disease, however, was comparatively mild in its character, and only continued for a few weeks.

The cantonment, though only situated one mile from the city, is said to be peculiarly exempt from this disease, for although it may be raging in the town and suburbs, not a case has occurred within cantonment limits. Perhaps the crowded state of the city, and the want of ventilation, drainage, and cleanliness in the poorest portions of it, are reasons sufficient to account for this, without taking into consideration the more favoured position of the military lines.

Small-pox has not of late years appeared, either in the town or neighbourhood, in the form of an epidemic. Before the introduction, however, of vaccination, no disease was more rife, or committed such ravages. Even now, in parts of the districts where the inhabitants, through prejudice or ignorance, refuse to

accept vaccination, small-pox appears epidemically, when hundreds fall victims to this frightful scourge.

The Civil and Military Hospital.

The Civil Hospital is situated in the town, and comprises a civil and military ward, and a ward for females.

The principal buildings are erected on a gentle slope of ground, the soil of which is gravelly and well drained.

The military ward was erected about 1840, by H. H. the Rajah of Sattara, at a cost of Rs. 8,000. It faces North and South, and consists of a large ward, 96 feet long by 19½ broad, height of wall 15 feet, well lighted by 15 windows. A spacious verandah surrounds the building, 8 feet broad, to the front and ends, and 13 feet at the back, the two extremities of which are built up to form a Dispensary and Surgery. The building will accommodate between 35 and 40 patients.

The civil ward is of a more recent construction, built in 1849, at the expense of Government, and at a cost of Rs. 4,000. It is situated at right angles to the military ward, and has an East and West aspect.

The room is a spacious one, well lighted and ventilated, and, with exception of being two feet broader, it is of the same dimensions as the military ward; and a verandah 7 feet wide surrounds the building. In the rear of these buildings is a cook-room, common to both Hospitals, and extensive privies. The one built by the Executive Engineer is defective, both as to its site, and want of proper drainage, and ought to be pulled down.

The Assistants' quarters are to the East of the main buildings; they are conveniently situated, and commodious.

The Hospital for females was erected in 1854. It is situated to the North of the principal buildings, faces North and South, and runs parallel with the great road leading into the town.

It comprises a centre ward, 49 feet long by 21 broad. The room originally intended for the female attendants has been converted into a lying-in ward. It is 21 feet long by 9 broad. The only verandah is to the South West, 8½ feet broad, the end of which has been built up to form bath-rooms, privies, &c.

The whole of the building is airy and well ventilated, and admits light by four good-sized windows. Outside the compound is a separate building for the accommodation of Dhers. It was built by the late Rajah, and has always been eagerly resorted to by this class of people, and is an arrangement appreciated by other patients attending the Hospital.

There are two large wells within the Hospital compound, but the water being brackish, it is only used for washing purposes. The drinking water is brought from a reservoir close by.

The reservoir is one of the 24 tanks which supplies the city of Sattara with pure drinking water.

The supply was first introduced, at a great expense, by the late Rajah of Sattara. It is brought down from the Euteshwur hill, 1,300 feet above the town, by means of a large stone aqueduct. On its entering the town, the water is led off in different directions by means of smaller pipes to supply the tanks situated in the several quarters of the city.

The work was found to be one of such great utility, supplying, as it does, to the inhabitants of Sattara in all seasons of the year, good drinking water, that the Municipal Committee has caused other tanks to be built; and in the course of time no part of the city will be without an abundant supply of excellent water.

Native Infantry Lines.

The lines are well constructed, and in good order, situated to the right of the main road passing through the cantonment, in the rear of the Officers' lines, on high ground, gradually sloping to the E. They are built in lines of sections, four to each company; there is ample space between the gable ends of each, and one company is divided from another by a road of 30 feet. Each section is divided down the centre, length-ways, by a complete party wall to the roof, thus dividing each block into front and rear, or facing N. and S. Each man's room is separated by a wall of kucha brick to the roof.

The lines were erected in May 1855, by the 26th Regiment N. I. They are of kucha brick, on rough stone and mud foundations; timber jungle-wood; single tiles. There are two large wells

in the lines, which run dry in May, and the water of which is brackish; drinking water is brought from other wells and springs near the lines.

The lines are built on mohrum; the soil around is a thin layer of black earth on a substratum of mohrum; towards the East the foundations are raised 8 feet to meet the declivity; the lines are well drained by a ditch which surrounds them, and before each of the different sections a trench 3 feet deep has been dug; the only appearance of damp is at the SE. corner, where half of one section of the grenadier company runs close to a well; water also lodges here for a few days after a heavy fall of rain.

The height of the rooms is 11½ feet at the centre, declining to 7 feet; they measure 10 feet by 9; outside is a verandah of 4 feet, which is converted into a room by putting up a thin mud wall, in this are placed a door and small window or air-hole.

The lines will accommodate the entire present strength of the regiment, about 750 men. The only place of confinement is the quarter-guard, which is situated about 78 paces to the extreme right of the lines; it is dry, and no particular disease has been traced to it.

Native Infantry Hospital.

The Hospital is a large, thatched, pucka building of brick, with stone foundations; it is situated at the SE. angle of the cantonment, in a large open compound abutting on the main road, which runs through the camp. The date of its erection is unknown. Water is brought by the bheesties from a well immediately contiguous to the Hospital.

The soil resembles that on which the lines are built; it is well drained by trenches in various directions. The Hospital is well raised, and free from damp; it faces E. and W., and is protected on three sides by a broad verandah and sloping roof, which comes low down on the E. side.

The main ward is 96 feet by 22, and 15 high; it has 13 windows and 4 doors.

The cots are in good condition, made of squared wood, 6 feet

4 inches long by 10 broad, and 14 inches high; 40 patients may be accommodated in the ward.

Offices. The cook-rooms and other out-offices are pucka built and in good repair; the former are tiled.

The Hospital is 150 yards from the lines, and has a large compound, in which the convalescents take the air.

The Hospital is very favourably situated, and no disease has ever been attributable to its locality.

IV.—TOPOGRAPHY OF JACOBABAD.

BY F. T. BOND, Esq., Assistant Surgeon, Sind Horse.

Jacobabad, in lat. 28° 17″ N., and long. 68° 30″ E., on the edge of the desert which separates Sind from Cutchee, is about 26 miles NE. of Shikarpoor, and is now the principal town on the North West Frontier of Upper Sind, the residence of the Political Superintendent, and the head-quarter station of the three Regiments of Sind Irregular Horse.

It is built close to the site of the old mud Fort of Khanghur. In January 1847 Captain (now General) Jacob was appointed Commandant of the Frontier, and the head-quarters of the 1st Regiment S. I. Horse moved up from Hydrabad to Khanghur, from which time it became a permanent military station.

On Captain Jacob's arrival, Khanghur consisted of the old mud Fort and a few miserable huts, with some 20 inhabitants.

From the time of Captain Jacob's being permanently located on the Frontier, Jacobabad dates its foundation, though it rejoices in this appellation since 1852 only.

This Officer having made his arrangements, and disposed of his men in such a manner as to at once put a stop to all disorders and lawless proceedings, commenced the work of civilization—an undertaking presenting in this desert place more than ordinary difficulties. How he succeeded is best shewn by the contrasted statements of the years 1847 and 1857, a lapse of only ten years. General Jacob in his "Report of the States and Tribes connected with the Frontiers in Upper Sind," says "on arrival at Khanghur desolation and terror were found to prevail everywhere in the country; no man could go in safety from place to place. Not a man of the Belooch settlers, the Jekranees and Doomkies, had

as yet attempted any principal labour, or even put his hand to any agricultural implement." Two villages, peopled by these tribes, Janadeyra and Jemal Khan-ke-gote, the former four, the latter three miles from Jacobabad, are now surrounded by cultivation, plundering having been entirely put a stop to.

Boundary.

Jacobabad is bounded from the North East to South West by the desert or waste which separates Upper Sind from Cutchee; on the South by the Shikarpoor Collectorate.

Elevation.

Jacobabad is about 300 feet above the level of the sea. The surrounding country may be said to be almost level, although there is a fall of one foot in 2 miles from the banks of the Indus; a dead level plain extends for 30 miles North, to Shapoor, from which place it again rises gradually to the foot of the Murree and Boogtee hills.

Communication.

The communication from all quarters is most excellent, the roads being good, and the majority of them bridged. When I say good roads, I mean as good as the material and nature of the country will allow. They are slightly raised in the centre, care being taken to have the lowest part above the surrounding ground, which causes them to dry quickly after rain, and to be uninjured by the canal water when the land is under irrigation. The natives denominate this kind of road fil-pusht.

Prevailing Winds.

During the hot months, or from the middle of March to the middle of October, the prevailing wind is Southerly, during the remainder portion of year North or North Easterly usually prevails. In April hot nights commence, and sand-flies and mosquitoes become numerous. In September a marked difference in the temperature of the nights takes place, when they become comparatively cool, a slight breeze springing up about 2 A. M.

Mountains.

There are no hills close to Jacobabad; the nearest are the Murree and Boogtee hills, about 60 miles to the North, and the Hala range of mountains, about 120 miles to the West. All these are of *primitive* limestone formation; both are unfit for a sanitarium for numerous

reasons. The nearest place for a sanitarium is, I should say, Mustung, above the Bolan Pass, in Beloochistan, the territory of the Khan of Kelat. This place is on an elevated, salubrious plain; but even to this locality there are reasons which would render it objectionable for a general sanitarium.

Rivers, Wells, Drainage, and State of Canals.

Jacobabad is about 60 miles from the Indus, the water from which is brought to it by the Begaree and Noorwah canals, from which latter are taken numerous minor canals used for irrigation. There are two large tanks at Jacobabad; one, being 28 feet in depth, contains water throughout the year. A year or two ago there were but two wells, which afforded but a scanty supply of very indifferent water. The wells are now numerous, the supply of water is good, and most abundant throughout the year. A few years ago the wells had to be carried to a depth of 47 feet, whereas water is now obtained at a depth of from 34 to 38 feet. The water in a new well is not by any means a pleasant beverage, consisting as it does of a strong solution of common salt, carbonate of soda, nitrate of potash, and frequently sulphuretted hydrogen. The wells are, however, dug near to the canals, so that the water permeates through; and if after this the well be regularly worked, the quality of the water will remain good.

There are no lakes or morasses near Jacobabad; small canals and drains being numerous, and all roads and floors of buildings raised above the highest water level, it consequently follows that the drainage is the best possible.

State of Canals.

All canals and drains are cleared annually, and are so constructed, by making use of the natural variations of level, that though constantly full during the inundation, the water is in no case stagnant.

Climate.

The climate of Jacobabad is perhaps the most extraordinary of any part of the British possessions in the East. In May, June, July, August, and sometimes the early part of September, the mean temperature is about 98°, nor does the range of the thermometer vary much during these months, the thermometer changing most after a dust-storm accompanied with thunder. For some days previ-

ous to one of these storms, which occur pretty frequently during the above mentioned months, the atmosphere is very close and loaded with electricity, and the storm coming on presents a magnificent appearance, as huge, dense masses of dust are driven in dark clouds before the wind, completely obscuring the whole surface of the country. These storms are sometimes accompanied by rain, but not always. After they have passed over, the atmosphere becomes quite clear, and the oppressive feeling experienced by many previous to the storm also disappears. These storms have also a sanitary effect, since fever or any other epidemic that may be prevailing at the time always diminishes after they have passed over. After the occurrence of a storm of this nature, the thermometer has been known to fall 35°. The cold weather is pleasant and salubrious. In December and January light frosts occur, but a cutting North East wind is prevalent in the months of January and February.

Medical Effects.

The climate of Jacobabad is undoubtedly not only very trying to the European, but also to the Indian constitution. It would, as it is now, be totally unfit for European troops. That the climate has very slightly altered for the better of late years is undoubtedly a fact. This has been caused by bringing the immediately surrounding desert waste under cultivation, and in course of time, as larger tracts are recovered, and the desert either disappears altogether, or gets intersected with large tracts of cultivation, the climate will doubtless be improved, and probably a regular annual fall of rain would take place some time in August, which would curtail the present long and exhausting hot season; and there is every reason to believe that this change would be effected by the large desert canal as proposed some time ago by General Jacob; for with the exception of a few sand-hills, which occupy a very small area, the whole is a good rich soil, requiring but water to produce luxuriant crops of cotton, jowarree, &c. The migratory tribes of Kelat, Jelawan, &c. would only be too glad to get a permanent abode. At present, these tribes are in a state of the greatest poverty: in the fair season obtaining a subsistence by assisting the agriculturists in Khorasan; but on winter setting

in they descend to the plains of Cutchee, and exist in the greatest misery and poverty. These people would gladly become the ryots of respectable zemindars, of whom there are many ready to come forward should the canal in question be excavated.

Diseases.

The principal diseases are fever, with its concomitants; its type is generally quotidian, though in the cold season it often assumes a remittent form with splenitis, which is very general: of those who dwell in the lower localities, and those who live near the banks of the river, there is scarcely an individual, man, woman, or child, who does not suffer from chronic enlargement of the spleen. After the inundation, when the Indus has subsided, fever becomes so general that labour of every description is stopped.

In the cold months affections of the chest become very general. The natives of Sind do not so much suffer from these affections as men from Hindoostan, who feel the extreme cold excessively, and unless well clothed would undoubtedly succumb. Rheumatism at this time is also very general. The inhabitants in the plains of Cutchee suffer greatly from ophthalmia, and are occasionally visited with a malignant fever, which proves fatal in from two to five days. Great numbers fall victims to this epidemic. From the account given by the natives, it would appear to be a modified description of cholera. They also state that those who take active remedies on first being attacked usually recover, but are very weak and quite unfit for work for many days afterwards. The remedy usually employed by these people is a strong purgative, of which medicine they have a great variety.

Almost every one, European and Hindoostanee, on first arrival in Upper Sind, is attacked with what is usually known as the "Sind boil." They appear on all parts of the body, and sometimes cover the patient from head to foot. They require constitutional treatment, with generous diet; otherwise they degenerate into indolent ulcers, which are extremely difficult to heal, often baffling all treatment. In such cases change of air seems to be the only remedy; and if this be not obtained, they run their own course until a change from the hot to the cooler months sets in.

They usually appear about May, and rarely occur after September.

The highest range of the thermometer in an artificially cooled house in the hot season is 98°. In the cold weather it usually stands at 65°.

Soil.

The soil is rich, and may be denominated a new one, it is composed of argile, with more or less sand, mica, and carbonate of lime, and in many localities a large proportion of salt, besides carbonate of soda and nitre; and is watered by the Indus, as previously explained. Towards the end of September and beginning of October, when the river falls, the exhalations are greatest, but evaporation takes place so rapidly that these quickly disappear, except in the immediate vicinity of the river, where there are certain low tracts which do not dry up so rapidly; many of these tracts afterwards appear as luxuriant wheat fields, some of them many square miles in extent.

Vegetable Productions.

The variety of vegetable productions is not great, not that they will not thrive, but the Sindees are too indolent to cultivate them, for in the cold weather and spring there is scarcely a garden vegetable that will not grow; and it may be remarked here that all classes of sea plants grow luxuriantly, the soil appearing to be peculiarly adapted to them. The following may be enumerated as the principal fruits and vegetables grown by the natives, viz. carrots, onions, radishes, dill pasand, egg-plant, fennel, spinach, bendee, mustard, cucumber, melons, and plantains. Mangoes and grapes will also grow well; there are no trees indigenous to the place. On Captain Jacob's arriving here, he found only two trees, which are still standing, close to the old Fort. Nearer to the banks of the river are to be found the tamerisk and ber, all the wood consumed by the inhabitants being brought from a distance of 40 miles. The planting of trees since Captain Jacob's arrival has been carried on most vigorously. Almost every description of tree that has been planted grows most luxuriantly, and exceedingly quickly, the station itself, at a distance, presenting the appearance of one mass of trees. The zemindars have

likewise been encouraged to throw down seed; and now, in every direction, trees are springing up, where a few years ago there was not a vestige of one.

Among the principal trees growing at Jacobabad may be mentioned the following:—sirus, babool (two kinds, Sind and Cabool), neem, peepul, blackwood, willow, ber, mango, &c.

Agriculture.

Agriculture is yearly largely increasing around Jacobabad; the farmers have three agricultural seasons, viz. Rubbee (spring), Peshrees (middle), and Khureef (autumn), the most largely cultivated and remunerating crops being jowarree, wheat, vetch (cring), and cotton. There are many others, such as till, hemp, rice, tobacco, sugarcane, &c., but these are confined to lands peculiarly adapted to their wants.

The farmers here have no idea of commencing a rotation of crops, or of manuring barren spots, nor could they indeed afford the outlay at present, had they even the inclination; after having cultivated a piece of ground, they allow it to lie fallow for two years.

V.—TOPOGRAPHY OF KOLHAPORE.

BY F. BROUGHTON, Esq., Civil Surgeon.

Situation.

Kolhapore is situated in N. latitude 16° 45″, longitude 75° 15″ E., and forms a portion of the Southern Muratha Country.

Boundary.

It is bounded on the North by Sattara, on the South and East by Belgaum, and on the West by the Southern Konkun.

Elevation.

Kolhapore is 1,797 feet above the level of the sea.

Facility and mode of Communication with place described.

This country can be approached with facility only during the dry season. In the monsoon numerous unbridged rivers present serious obstacles on the North East and South aspects, and on the West the Ghaut country, in consequence of its dangerous nullahs, becomes impassable.

General direction of prevailing Winds.

From June to October the South West wind (the sea-breeze) blows freely through a gap in the Ghauts from 3 or 4 P. M., and continues all night. From November to February Northern and Easterly winds prevail.

Mountains.

The area of Kolhapore consists of valleys of various fertility separated by mountainous ridges extending in spurs in an Easterly direction from the Western Ghauts.

Notices of such Ranges as might afford advantage and convenience for sick or convalescent Troops.

The dismantled hill of Punalla, ten miles distant from the city, is admirably adapted for a sanitarium. Its temperature is 12 degrees below that of the plain, and the air cool and bracing. Its elevation is 975 feet above that of the plain, and it is abundantly supplied with excellent water.

Cholera, according to tradition, cannot enter the ancient gateways of this once famous fortification. This singular exemption from disease continues, notwithstanding the destruction of the walls, and may be attributable to the purity of the air, in some measure, perhaps, to the elevation, but, in my opinion, principally to the fact that the inhabitants are accustomed to carry their clothes below the Fort for washing purposes, and consequently drink the pure and uncontaminated element, which is impregnated with iron from the ore found in the hill.

A Sanitarium.

During the last ten years I can safely affirm that cholera has never appeared as an epidemic in the Fort, and but five or six solitary cases have occurred during this period.

This is the more remarkable as cholera has frequently prevailed in a virulent form in the numerous surrounding villages. The hill men descend with their grazing cattle into the plains daily, and mix with the villagers in their Bazaars and in the different employments of agriculture.

The inhabitants of the villages below likewise daily carry up wood, grass, &c. for sale into the Fort; and the occurrence of the few cases I have cited may thus be accounted for and explained. The only instance I have myself seen was a man who came up in the last stage, and died in two hours.

This hill, once the residence of the Court of Kolhapore, is now thinly inhabited, and contains but 217 houses, and a population of 1,580. The distance round the walls is nearly seven miles, and the unoccupied area would afford ample accommodation for troops.

The Bazaars are well supplied, and the civil employés of this

station possess residences upon the hill, to which they retreat in the hot weather. Punalla is composed of red soil of varying depth, supported upon pillars of basalt, the surface undulating, and covered with wild flowers. Cultivation is carried on to a small extent by the inhabitants, and fruit and coffee are produced of excellent quality.

Sea and Rivers.

Kolhapore is well watered by the rivers Warna, Punchgunga, Doodgunga, and Steernkassee, which all rise in the Ghaut country, and after flowing through its valleys join the Kristna.

Their breadth and junction is various, as the Warna is 222 feet, Punchgunga 577, and Doodgunga 192.

From their sources in the West until they emerge from the mountainous tract on to the plain (a distance of 30 miles), these rivers are fed by numerous tributaries.

Lakes and Wells.

There are 197 tanks and 11,908 wells in this country, which supply 1 city, 47 towns, and 1,335 villages, in an area of 3,184 square miles.

Morasses, Drainage.

There are no morasses. The drainage of this country is naturally secured by its invariably undulating character.

During the monsoon the rivers frequently overflow their bank, and inundate the surrounding country, but this is never of a longer duration than two or three days, when the land re-assumes its ordinary condition.

Canals.

An ancient and well-constructed canal or water-course assists in supplying the city of Kolhapore with water from a neighbouring hilly range.

In the valley where the water is collected bunds of masonry form reservoirs, and the water is conducted under-ground in an artificial channel. To provide for seasons of unusual drought, wells were also constructed in proximity to the aqueduct, by the assistance of which a supply could always be insured, artificially, by the aid of draw-bullocks.

Climate.

The climate of Kolhapore is temperate. The following table shows the range of thermometer and fall of rain for the last 10 years :—

	Thermometer.				Rain.	
	Minimum during the year.	Maximum during the year.	Mean of daily Minima.	Mean of daily Maxima.	Inches.	Cents.
For the year 1847	64°	80°	71·299	78·000	28	81
Ditto ditto 1848	61	92	68·416	84·416	25	04
Ditto ditto 1849	60	94	67·750	85·250	33	04
Ditto ditto 1850	59	97	69·666	84·416	32	47½
Ditto ditto 1851	55	93	69·666	83·633	36	69
Ditto ditto 1852	55	92	67·417	83·166	50	46
Ditto ditto 1853	60	96	70·417	86·166	63	42
Ditto ditto 1854	62	95	70·000	82·833	42	80
Ditto ditto 1855	60	93	70·166	82·583	37	29
Ditto ditto 1856	67	90	73·444	82.555	49	28
Average total of Thermometer with low and high degree, and also the total of the fall of rain for the last 10 years	55	97	69·824	83·001	399	30½

The average temperature, therefore, for the last 10 years is 76°412, and fall 39·93.

In the average for the first five years of my residence—as published in Major Graham's Report—the tables exhibited a temperature of 72½°, and a fall of rain of 30·18 cents.

It is thus evident that the fall of rain has increased 9 inches during the last 5 years, and the temperature by 4 degrees.

Its physical character and medical effects, &c., with the highest, lowest, and medium states of Thermometer.

This increase is not confined to the city, for the district returns show the same result, as will be seen from the following table :—

Return of Rain Fall in the Districts.

	1848		1849		1850		1851		1852		1853		1854		1855		1856		Total.		Average for 9 years	
	Inches.	Cents.	Inches.	Cents.	Inches.	Cents.	Inches.	Cents.	Inches.	Cents.	Inches.	Cents.	Inches.	Cents.	Inches.	Cents.	Inches.	Cents.	Inches.	Cents.	Inches.	Cents.
Altah	19	16	35	25	25	05	29	97	65	0	26	59	19	23	14	46	16	80	251	51	27	94
Boura (Fort)	3	03	281	51	294	90	280	32	361	30	381	40	286	65	190	70	270	57	2350	38	261	15
Bhoodeergud	67	30	109	16	53	90	71	60	77	0	81	40	82	04	68	71	71	84	695	71	77	30
Punalla	43	40	73	06	64	64	55	79	75	19	96	35	54	02	35	80	80	35	553	50	61	50
Vishalgud	90	25	77	0	46	0	61	50	63	75	74	50	46	50	35	0	46	0	540	50	60	05

The district of Altah, the first on this list, is situated inland, and nearly beyond the range of the sea-breeze, and is scantily supplied with rain.

Bhoodergud, Punalla, and Vishalgud, on the hilly range, have a plentiful fall, whilst Boura, a hill-fort on the edge of the Ghauts, is annually deluged with upwards of 200 inches of rain.

Towards the Westerly Ghauts, which are covered with wood, and thoroughly saturated during the monsoon, the air is always cool and enjoyable, whereas in the plains during the months of April, May, and June, hot Easterly winds prevail during the day.

The entire district, however, is partially under the influence of a sea-breeze, which commences in the afternoon, and invariably secures a cool night.

The effect produced upon the traveller from the Konkun is pleasant and invigorating. Like all other Deccan elevations to long residents in the Konkun, a sense of fulness in the head or liver is apt to supervene after arrival; and malt liquor is not here consumed in anything like the proportion obtaining among residents on the sea level.

This tendency to congestion passes away after a time, and the climate may safely be pronounced as exceedingly healthy both to the Native and European constitutions.

The soils of the district are of three kinds; the black and most productive consists of fine argillaceous mould, thickly impregnated with nodules of limestone, a fresh crop of which is washed up and exposed by every fall of rain.

Soils.

Fragments of quartz and other ingredients of the neighbouring decomposing rocks in my opinion indicate its origin by disintegration therefrom.

Black.

This soil is invariably found near the rivers, and extends through the bottoms of valleys, and is deepest wherever water (which appears mainly to assist in its production) is most abundant.

Red.

The red soil is met with on the slopes and higher ledges. It is, I believe, equally the product of disintegration of the neighbouring rocks, but the colouring matter (an oxide of iron, in minutely divided grains) is

washed out of it, and thus the difference of hue is accounted for. During the rains this intensely black powder is seen pouring in inky streams from freshly ploughed decomposing surfaces, and is collected and used as pounce.

Light Earth.

In the hilly districts a few other lighter varieties are found, as the product of trap associated with earthy bases, and yellow and other ochres are seen in varied layers between basaltic formations; but the two former descriptions of soil constitute the great divisions of the country.

Its Elevation above adjacent Water.

As might be expected from the foregoing description of the formation of black soil, these tracts are more liable than the red to inundations in the monsoon. In the situations where the fall of rain or overflow of rivers is not retained by artificial means for irrigating rice land, &c. these spots become nearly as dry as the more elevated red portions.

Noxious Exhalations.

Evaporation commences soon after the end of the monsoon, and noxious exhalations appear to be more deleterious at the commencement than at a more advanced period of this process.

Products.—I. Mineral.

From the absence of stratified rocks, Kolhapore is scarce in mineral productions.

Stone.

It is almost wholly composed of trap, which, in some places, assumes the columnar form. At Joteeba, about 9 miles from Kolhapore, there exists a very fine description of this stone, which takes a high polish, and is used for ornamental building. It is very dark in the grain, and appears, in the polished state, much like black marble.

Iron.

At Punalla, Bhoodergud, &c. iron ore abounds. Irregular masses of it may be picked up lying on the surface of the ground, but it is chiefly obtained by excavation. The vein lies generally a few feet from the surface, and the stratum of ore seldom exceeds 8 or 10 inches in thickness.

With regard to the vegetable products the chief are rice, Nachnee, jowarree, tobacco, wheat, gram, cotton, sugar-cane, native vegetables, also the cocoanut, tamarind, mangoe, custard-apple, jack-fruit, ramphul, guava, pomegranate, citron, lime, fig, plantains, pine-apple, white and black grapes, mulberry, musk and water-melon, radish, carrot, sweet potatoe, onion, garlic, cucumber, gourd, brinjal, chilli-pepper, ginger, turmeric, peas, beans, Indian corn, linseed, castor-oil, aniseed, hemp, jagree, betelnut, and coir.

Products.—II. Vegetable. Grain; Fruit.

Vegetables.

The rice crops are abundant, forming nearly one-third of the entire produce of the country.

Rice.

The cotton plant is very serviceable, for, besides the fibre, the seeds are given to cattle, the leaves to sheep and goats, and the dry stalks are used as firewood.

Cotton.

Tobacco is cultivated only in small quantities. Hemp is a staple of great demand in the Kolhapore market. The plant is sown in large quantities every alternate year. The Kolhapore mangoe is very indifferent. Native vegetables are abundant and cheap. The coffee plant thrives luxuriantly. The sugar-cane is of a very good quality, yielding abundance of juice.

Tobacco; Hemp.

Mangoes.

Coffee.

Sugar.

Gums are procured from the babool tree, mangoe, khair, &c. The best description is procured from the former of these trees, but that from the latter, on account of its supposed medicinal qualities, is held in great esteem by the natives.

Gums.

Medicinal plants, such as they are, are numerous enough, but must be considered almost valueless.

Medicines.

The timber of the Western Ghauts is large, good, and abundant.

Timber.

Manufacture.

In addition to the articles abovementioned, some of those manufactured in the State may be briefly noticed. The chief of these are cotton cloth of a coarse fabric, woollen cumblies and numdas, which are both cheap and plentiful; goor, oil, paper of a coarse texture, snuff, country liquor, carpets of an inferior quality, and various articles of pottery ware. Of glass and lac bracelets there is also an abundance.

Products.—III. Animals. Domestic.

Domestic animals are numerous. In this category may be enumerated camels, cows, bullocks, buffaloes, goats, sheep, horses, dogs, asses, pigs, &c.

Wild.

Of wild animals the chief are the bison, sambur, spotted deer, beckree, wild dog, monkey, tiger, panther, bear, wild boar, hyena, wolf, tiger-cat, fox, jackal, mongoose, hare, antelope, &c.

Birds.

Of birds, the florican, pea-fowl, jungle-fowl, partridge, snipe, quail, wild duck, teal, and wild pigeon are the chief.

Fish; Reptiles.

Fish of numerous varieties, turtles, and alligators are occasionally found in the rivers and tanks.

Animal Products.

It need scarcely be added that there is no dearth of hides, horns, wool, butter, ghee, honey, and wax.

Agriculture.

(See Major Graham's Report.)

Roads and Communications.

Although the soil of Kolhapore admits of good roads being made at a comparatively trifling expense, they are yet, perhaps, the worst in this part of India. At all times indifferent, they are during the monsoon months scarcely passable for any description of wheel carriage.

The road from Sattara to Belgaum passes through Kolhapore. Although sundry obstructions have been removed, there is still ample room for improvement. With the help of extra bullocks,

carts at this season of the year labour at the rate of about a couple of miles in three or four hours, without any further accident than the occasional breaking of bullocks' legs in the deep mud, or the capsizing of the cart and destruction of the kit.

The road from Viziadroog to Belgaum strikes off at Weeroolee, passing in a South Eastern direction for 54 miles, through the districts of Bhoodergud, Gur Inglus, and Azra.

By the contemplated completion of the Phonda Ghaut Kolhapore may be brought nearer the sea, Wagotna being only 70 miles distant.

There are eight openings through the range of Ghaut which forms the Western boundary of the State. These are available for the descent of laden cattle towards the sea. They lead to Rajapoor, Rutnagherry, Kharaputun, Viziadroog, Warree, and Wengoorla; and a uniform toll is levied on all.

A road has been marked out traversing from West to East the entire country from Phonda to Sanglee, a distance of 66 miles, and passing through the city of Kolhapore and other large market towns towards the valley of the Kristna, the collectorate of Sholapore, and the Nizam's territories.

The chief natural obstacles in the way of internal transit are the numerous unbridged rivers towards the Eastern part of the State, and the Ghauts towards the West.

The diseases of this country (endemic) are fever, remittent and intermittent, worms of various kinds, as Guinea-worm, tape-worm, round-worm, thread-worm, and itch.

Diseases, Endemic.

Epidemic. Of epidemic diseases we have cholera, small-pox, measles, chicken-pox, and hooping-cough.

Hereditary. Of hereditary origin, consumption.

Manufactures are little cultivated in this State beyond carpets, coarse paper, and sweetmeats. No particular influence upon disease is consequently to be described as thus produced.

Manufactures; their influence.

Of the peculiar diseases to prisoners I can instance one, viz. the danger to life necessarily incurred by confining members of wandering and predatory tribes.

Prisons; their influence on predatory Tribes.

These people cannot bear imprisonment without detriment to health, and they pine and die when so circumstanced. It would appear to be desirable that some other mode of punishment could be substituted in such cases.

General influence on Health.

With this exception, the discipline of this prison appears to exercise a beneficial influence upon the health of the inmates. They arrive, generally speaking, more or less covered with itch, and unfit for active employment, but by good feeding and hard work, although, with few exceptions, they lose a pound or two in weight, they leave the Jail in excellent condition.

I subjoin the statistics of this prison from its first occupancy :—

	1848	1849	1850	1851	1852	1853	1854	1855
Strength of the Prisoners.	181	121	169·8	177·2	153·5	128·5	139·9	123·0
Number of treated	216	170	58	213	194	176	182	77
,, of Deaths	8	4	..	1	1	1	2	..
Ratio per cent. treated to Strength	119·3	140·4	34·1	120·1	126·3	137·6	130·0	62·5
,, ,, Deaths to treated	3·7	2·3	..	0·4	0·5	0·5	1·0	..
,, ,, ,, to Strength.	4·4	3·3	..	0·5	0·6	0·7	1·4	..

Of the diseases enumerated there is nothing to remark as distinguishing them from the same diseases when met with in other localities, except that the most prevalent form of sickness is intermittent fever, mild in type, and amenable to treatment.

I append a ten years' return of disease in a native regiment under my charge, as elucidating the effect of climate upon natives; also the returns of the Civil Hospital and Dispensary since their commencement.

Return of the Sick in the Civil Hospital at Kolhapore for the last 6 Years.

	1851	1852	1853	1854	1855	1856
Number of treated	51	95	56	69	49	127
„ of Deaths	2	2	2	3	2	8
Ratio per cent. of Deaths to treated	3·9	2·1	3·5	4·3	4·0	6·2

Return of Dispensary Patients attending the Civil Hospital at Kolhapore for the last 6 Years.

	1851	1852	1853	1854	1855	1856
Number of treated	786	880	884	1441	2898	2655
„ of Deaths	105	4	8	5	..	28
Ratio per cent. of Deaths to treated	13·3	00·4	00·9	00·3	..	1·0

Return of Kolhapore Infantry Regiment.

	1847	1848	1849	1850	1851	1852	1853	1854	1855
Strength of the Regiment	526·6	542·2	567·2	593·3	572·5	572·9	572·8	572·6	573·1
Number of treated	586	492	345	155	365	387	265	216	147
„ „ Deaths.....	4	4	3	1	1	..	1	..	..
Ratio per cent. of treated to Strength	111·2	90·7	68·8	26·1	63·7	67·5	46·2	37·7	25·4
„ „ Deaths to treated	0.6	0·8	0·0	0·0	0·0	..	0·3	..	..
„ „ „ to Strength ..	0·7	0·0	0·0	0·0	..	..	0·1	..	..

Population.

The population of Kolhapore was computed in 1849 to be 5,46,156; that of the city alone, 43,387.

The numbers at present residing in the city would probably be found nearer 60,000; of these 278 are above 80 years of age, and but 19 above 90; none have reached a hundred.

Longevity.

I am disposed to think the average duration of human life in this country is far below that of Europe.

The dwellings of the inhabitants of this city are composed of stone and sun-dried brick. They are tiled, and the windows are invariably small, and frequently absent altogether. The little light and air desired by the people is admitted at the door, which is generally low and narrow. Their clothing in common use is of a very primitive description, although upon festal occasions they assume the cloths of varied colour which remain as heir-looms in the family.

Dwellings.

Bedding.

Their bedding is generally composed of a single rug; pillows are not generally considered necessary, nor bedsteads. Some luxurious folks, indeed, construct a raised shelf against the wall, which is, however, as hard and of the same material as the floor, while a few (whose intercourse with Europeans has led them to adopt our customs) can boast of a wooden frame, across which coir ropes are knotted as a couch.

Furniture consists in cooking pots, and the family looking-glass, generally very small and round, and of the cheapest description. Persons of wealth in addition to this possess one or more boxes for the security of their effects, but pots and pans are the furniture of this people.

Furniture.

Fuel.

Fuel consists of cakes of cowdung and sticks purchased in the Bazaars.

It is remarkable that in the poorest houses the fire is never entirely extinguished; the ashes are collected, and a cake of cowdung retains the spark until the morning. This is not done from any superstition as to ill luck attending its extinguishment, but arises from laziness and unwillingness to take the trouble of procuring a light by flint and steel. Sooner than undergo this fatigue, they submit to the inconvenience arising from the in-

creased temperature and smoke which pervade the chimneyless building, even in the hottest weather.

Barracks. The station being set apart only for Native troops, there are strictly speaking no Barracks.*

The Native infantry lines erected in May 1855 consist of ten rows of huts; each row is divided into four sections. One wing, or five rows, is separated from the other wing by a street 155 feet broad. Although well situated, being erected upon a dry, rocky elevation, these huts are of an inferior description, and are built only of kutcha brick, and are single-tiled.

The water for the use of the troops is procured from several wells within camp, but this supply being deficient, it has been found necessary to purchase and secure for the men in the hot weather the use of one or two wells in the immediate neighbourhood of camp.

The lines are built upon rock, which is undergoing disintegration, and slightly covered with red soil; that in the immediate neighbourhood is black. From their elevated site, the lines are free from damp, and are exposed to the sea-breeze. They face the SW.

The sepoys' huts are 14 feet in length, $8\frac{1}{2}$ in breadth, and the height is a graduated slope of from 11 to $5\frac{1}{2}$ feet. They are single-tiled, possess but one door, and have no window.

Prisoners are generally confined in the quarter-guard, which is situated on the South East of the lines. No particular disease has been traced to it as a place of confinement.

The Hospital. The Regimental Hospital is built on a rocky, elevated site, towards the South of the cantonment. It looks towards the South West, stands about 500 yards from the lines, and a mile and a half from the city.

It consists of one large and well-ventilated ward, 96 feet in length, 22 in breadth, and 16 in height. Round this is a broad verandah, open at the front and back, and closed in at the ends,

* This was in 1856.—*See Note at end.*

forming at either end three small rooms. One of these rooms, 22 feet by 8½, is used as the surgery, the corresponding one at the opposite end is set apart for special cases, either those which would prove offensive to the other patients in Hospital, or such as require to be kept by themselves. There remain four small square rooms at the four corners of the building; these are 8½ feet square. The two at the surgery end of the Hospital are used, one as a dispensary, the other to hold medical stores and necessaries of all descriptions; the two at the other end are employed, one as a room for *post-mortem* examinations, the other as a ward for itch cases. It may here be stated that all these small rooms are well provided with doors and windows.

The open verandahs are 96 feet long, and 10 feet broad. The floor of the Hospital, raised to the height of several feet from the ground level, is composed of cut-stone, as also that of the verandahs.

The walls are built of stone and lime; the roof is double-tiled; on the roof are three ventilators in the shape of iron revolving cowls.

The out-houses, six in number, are used as cook-rooms, 25 feet by 12 in size, and are built of stone and lime.

The Hospital compound, closed in by a low hedge, is about 120 yards in length, and 117 in breadth. Within this compound stands also the Artillery Hospital, a building of precisely the same construction as the Regimental Hospital, but of smaller dimensions.

The main ward is 50 × 22; the small rooms are of the same size as in the other Hospital, and set apart for the same purposes.

The open verandahs before and behind are 50 × 10. The cook-rooms belonging to this Hospital, three in number, resemble those of the other Hospital, but are smaller, being 15 × 12.

There are two large necessaries situated at the back of the Hospitals. They are under one roof, 8 feet high, and connected by covered passages; a partition wall inside divides them; one is 30 × 12, the other 25 × 12.

The situation of the Hospitals being the best possible, no patients have suffered from their position, nor are they likely in future years to do so.

[NOTE.—Since the foregoing report was written the station of Kolhapore has been considerably augmented.

A wing of the 2nd European regiment and a full company of artillery are now comfortably housed in well-ventilated Barracks, which have been constructed with a view to accommodate double the number of Europeans if necessity rendered such a measure desirable.

Patcheries affording ample room for the families have been built, with school-rooms, &c. These Barracks were originally intended to be temporary, and were framed with the timber which returned from Persia, and was there used in a similar manner. By building up the walls, however, of burnt bricks, and adding tiled roofs, the erections may be now described as permanent.

They are placed on high ground, affording excellent drainage, and face North and by West, the position which has been proved by experience to be the most advisable for Kolhapore.

A new Hospital has been sanctioned, and the site determined upon in the vicinity of the new Barracks.

1*st March* 1859. F. B.]

VI.—EXTRACTS FROM A REPORT ON THE TOPOGRAPHY OF DHOOLIA.

BY M. MACKENZIE, Esq., Civil Surgeon.

The civil station of Dhoolia lies in longitude 75° 20″ E., and latitude 21° 10″ N., having an elevation of 230 feet above the level of the sea.

It is bounded on the North by the river Pandjerra, on the South by a range of hills, of which Lulling (400 feet) is the highest ; to the East and West the country is comparatively level.

From the Lulling hills the slope towards Dhoolia is gradual, but within half a mile of the station it ceases, and becomes flat. On this the town of Dhoolia, the Jail, Civil Hospital, Native infantry lines, the Bheel corps lines, all other public buildings, and European houses, are erected.

The river Pandjerra runs East and West on the South of and close to the station ; the bed of the river is wide and rocky, but during nine months of the year may be said to be quite dry, a few standing pools of water alone remaining in it. About a mile above Dhoolia Government have, however, erected a Bundarra, where the water is collected and carried into and through the village by means of an aqueduct. Another Bundarra is erected a mile on the other side of the village. Were it not for the above substitutes, the station would in the hot season suffer severely from drought ; and as it is, this aqueduct generally during the month of May is also dry, obliging the natives to procure water by digging holes in the bed of the river for their daily supply. Numerous wells of a greater or less depth are scattered throughout the town and station, which also aid in the supply. The ground on the North side of the Pandjerra is considerably

higher than on the South, and would unquestionably have been a more elegible site for the station, inasmuch as the ground, not only is more elevated, but has a gradual slope, which would have carried off the rain.

Many measures have been adopted to insure good drainage, but without effect, and much of the sickness daily coming under my observation, especially towards the close and immediately after the rains, may be traced to this cause.

The country for many miles around Dhoolia, and indeed throughout the whole of Candeish, is covered by low jungle, principally of the "babool" and "ber" kind, but the nature of the cultivation is such, that parts which produce crops one season are the next left to nature, and soon become as wild as before: this must ever be the case where so large a tract of country has so few inhabitants.

There is no locality that can be pointed out as a fit station for convalescent troops, the hill of Lulling being steep, rugged, and encumbered by large boulders of rock, and the summit uneven and covered with ruins.

About three miles from Dhoolia, in a North West direction, there is a large tank of considerable depth, and when full of water, of about 6 miles in circumference; the fields in the immediate vicinity are at a certain season irrigated by this water.

The chief mode of communication with Dhoolia is from the South by a well-made Government road from Bombay, *viâ* Nassick and Malligaum, the latter station being 30 miles from Dhoolia; this road is continued Northward to Mhow and Indore. A cross-country road, never in very good repair, leads to the Fort of Asseerghur, *viâ* Dhurumgaum, the head-quarters of the Bheel corps.

The prevailing winds are generally Westerly and South West.

The nature of the soil in and around the station is chiefly of a rich black loam, interspersed here and there with patches or beds of mohrum.

Numerous trees of the "neem" kind are planted around camp. The leaves of this tree are much used by the natives, in form of poultice, in guinea-worm.

The extremes of temperature are very marked, as will be seen by the following table:—

Range of the Thermometer and Fall of Rain at Dhoolia for the Years 1855 *and* 1856.

	1855.			1856.		
	Thermometer.		Rain.	Thermometer.		Rain.
	Max.	Min.	In. ct.	Max.	Min.	In. ct.
January	77·6	61·9	0 24	82·8	63·9	....
February	79·6	67·8	0 60	86·4	65·9	....
March.....	89·8	72·9	0 34	96·6	76·2	....
April	99·1	79·9	....	101.6	81·3	....
May	104·6	84·6	0 35	101·5	83·9	2 24
June	93·1	81·7	6 73	91·1	81·2	6 82
July	85·2	79·4	0 16	84.3	82·5	3 24
August	89·2	85·9	1 13	85·2	78·4	3 4
September.....	85·9	77·3	1 54½	83·3	76·2	4 8
October	87·8	76·4	1 0	86·3	72·3	1 23
November	85·3	85·9	....	82·7	65·8	0 15
December	80.4	60·9	....	79·5	60·8	0 3
	88·1	72·7	12 9½	88·8	68·7	21 1

The total fall of rain for 1855 was 12 inches and 9½ cents, while that for 1856 has been 21 inches.

The climate of Dhoolia is, on account of the great variations of temperature, most depressing, and its effects are very evident in cases of fever, which seem at once to deprive the patient of all power of a favourable reaction. Rheumatism is very common amongst all classes, assumes a very severe and most persistent form, and often sets at defiance remedial measures. In as far as regards dracunculus, the origin of this disease is very uncertain as yet, but I would, from one cause alone (viz. the guinea-worm being almost invariably found on the lower extremities), venture to suggest that it is not by drinking water, but by washing in it, that the worm is produced, and by imperfectly drying the lower extremities after bathing.

Deleterious exhalations take place chiefly towards the latter end of the rains, and continue to a greater or less extent up to the end of November or middle of December, according as the quantity of rain has been much or little.

The lines of the Native infantry detachment are parallel erections built of native bricks, and on the East and West sides. They have wells, which supply good water.

The lines are low and irregular, dark, crowded, and uncomfortable, and dwelling in them must tend to produce much of the fever and rheumatism complained of; almost daily one or two cases of scorpion-stings present themselves. The lines lie so low that the rain on falling accumulates around, and the small drains cut on all sides are almost useless.

Of the vegetable products around Dhoolia the following may be mentioned :—

June (sowing season).—Tillee, jowarree, kuppas or cotton, rice, plaintains, mukee, brinjals, chillies, nimboo (lemon), betel-nuts, huldee or turmeric, tooree, raggira, pomegranates, lussun, ramphul, rattaloo, aubla, custard-apple, mango, boree, orange. *July.*—Bajree, kooltie. *August.*—Tobacco. *October.*—Carrots, linseed, wheat, gram, beans, salloo. *December.*—Water-melons.

The animal products are very numerous, and number amongst them the tiger, hyena, jackal, cheeta, lynx, nyl-ghy, wild hog, sambur, antelope, fox, wolves, and bears; duck, partridge, bustard, peafowl, snipe, florican, &c.

I am not aware of any mineral productions in the country around.

The population of Dhoolia is an increasing, but fluctuating one. At present it is between 10,000 and 11,000 souls.

Civil Hospital.

This building has a Westerly aspect, is very airy, and can accommodate with comfort 20 patients.

The Hospital compound is surrounded by a good hedge, and is entered by two gates, one at the North, the other at its Easterly aspect.

The stated hours for the supply of medicines to out-patients is from 6 to 8 A. M., and from 4 to 6 P. M.

Jail Hospital.

This is a small upper-storied building within the walls, and at the North angle of the Jail; it can comfortably accommodate 12 patients; as there is no room for females, they are attended to in their own cells.

From the flat nature of the soil on which the Jail is built efficient drainage cannot well be had, but it has lately been much improved. The prisoners are generally healthy, and have a very liberal diet. The various trades, viz. blacksmiths, carpenters, weavers, &c., are carried on within the Jail by about half the number of prisoners, while the remainder are set to out-door labour.

There are within the walls three wells of good, wholesome water; and the prisoners use it twice daily in washing themselves.

N. I. Detachment Hospital.

This is a good, comfortable building, capable of accommodating 16 patients in the centre room; the verandah around is 8 feet wide, and is used by patients if the ordinary ward is too full. This building is of brick, chunammed all over, and is capitally ventilated. The compound is enclosed by a good hedge, and has within it accommodation for all the Hospital subordinates. The aspect of the building is Northerly, it is about 300 yards from the lines of the detachment, and is erected on black soil, which here is unfortunately very level, and retains much of the rain during the monsoon.

The lines themselves are a fruitful source of fever and ague, rheumatism, &c.

Bheel Lines and Hospital.

A small building to the West end of the lines is usually denominated the Hospital, inasmuch as in it a stock of medicines is kept, which the assistant distributes daily, as required. The men of this detachment refuse to enter Hospital when ill, preferring their own close hovels. The above building is of brick, and tiled on the roof.

VII.—EXTRACTS FROM A REPORT ON THE TOPOGRAPHY OF SAWUNT WARREE.

BY J. KEARNEY, Esq., Assistant Surgeon.

Situation.

The town of Sawunt Warree, or as it is also called "Soondur Warree," is situated in latitude 15° 56″ N., and longitude 74° E., at an elevation of 357 feet. It lies about 14 miles ENE. of Vingorla, and 7 miles WNW. from Banda.

Locality.

Like other towns of Native origin, its situation is the worst that could be selected, viz. in the hollow of a basin, the sides of which are formed by chains of hills, which almost completely surround it. It is built upon undulating and irregular ground, close by the base of a range of hills which face its Western aspect, and around a large tank or lake. The difference of elevation of its surface is in some places as much as 30 feet. This irregularity of the ground serves much to lessen the disadvantages of its locality, as it materially subserves the purpose of natural drainage. No standing pools of water can exist, the rain flowing off in one direction to the tank, and in the other towards nullas and little rivulets which run outside the town. This natural drainage is further assisted by the hard and impenetrable nature of the soil, which is stony and rocky, being a portion of the great granitic upheavement that raised the surrounding hills.

Lake and Scenery.

Warree well deserves its synonym 'Soondur,' or beautiful. The tank in the middle of the town is of considerable size (being 750 yards long, and 250 yards broad), of irregular shape, and surrounded by a mixed foliage. There are large, thick, and huge exogenous trees, intermingled with slender and lofty palms, among which the tall and slanting cocoanut trees are prominent. The tank is called

the "Warree Lake," a name which an observer standing on an elevation at its Eastern aspect cannot fail to accord to it, when looking down upon the smooth surface of water encircled by a variety of foliage, having a beautiful and delightful permanent hue of green, and walled as it were on the opposite side by a range of hills covered with thick forest. The lake is known to the natives by the name of "Motee Tulao," the Pearl Tank, from the circumstance of several pearls having been found in it at an early period of its existence.

Description of Town.

Sawunt Warree is not above three miles in length, and one and a half broad at its extreme limits. It comprises the Fort, the Bazaar, the local corps lines, the lake, with the intervening dwellings of the natives, and a few adjacent rice-fields.

The Fort.

The Fort is the residence of the Sir Desaee, and of the Political Superintendent; it is of an irregular shape, and is constructed of towers and curtains, loop-holed; the bastions are not capable of holding ordnance from their dilapidated state; and there are no embrasures. The walls are built of loose stone and mud, and are also dilapidated. A ditch runs round the walls on the North East and South sides, dry in the fair season, but full in the monsoon; but it is gradually filling up, which is desirable, as otherwise it becomes a receptacle for nuisances. The Fort, from its irregular shape, may be considered as formed of an oblong and an oval portion. In the oval is situated the residence of the Political Superintendent, with the adjoining offices. It is of a lower level than the square; in which are the Jail, the Treasury, the Native Courts of Justice, the residence of the King, and at its further limits is a considerable elevation on which the Station Hospital is raised.

Station Hospital.

The Hospital is an irregular-shaped building, constructed chiefly of red cut-stones, plastered over with chunam. It is lofty, and has ample accommodation for 40 patients; the roof is well tiled and sound; the floor is of common red clay, and is raised a foot from the ground. The building runs from East to West, and from its

elevated situation is well exposed to the sea-breeze. It is amply provided with out-offices, and has a small compound attached; and altogether is a very good building. As but few inhabitants of the town seek admission, it has always been used for the sick of the local corps. At the back of the Hospital is a small enclosure, intended for the reception of female patients, capable of holding about 12 patients.

Local Corps Lines.

About 280 yards from the North East corner of the Fort the lines of the local corps are situated: a long range of huts built on a rising piece of ground, which accommodate 200 sepoys with their families. In the vicinity of this is the bungalow of the Adjutant of the corps; and close by there is a small shed, which temporarily answers, though indifferently, as a small Hospital for the corps.

Bazaar.

Running in a longitudinal direction Southwards from the Regimental lines, are the Bazaar and Native town. The buildings are of mud, and strongly roofed with tiles. They occupy a space of nearly a mile, and terminate at the base of the Warree hill.

Warree Hill.

Warree hill is the most elevated point on the range of hills which faces the town on the West. It is about 1,200 feet high, and affords a very pretty and extensive view of the town and adjacent country; its summit is not level enough to admit of more than one or two buildings to be raised on it. It is thickly covered with forest, containing some very fine teak trees; in the rains it is infested with tigers, cheetas, and other wild animals.

Other Buildings.

Close by the Southern side of the lake, and facing the Fort on the opposite side, is the residence of the Commandant of the corps, and on the Eastern aspect that of the Sub-Assistant Surgeon, late in medical charge. Warree also contains a Portuguese church, a Native library, and a dhurumsalla, the two latter being new buildings of much utility. The European troops are accommodated in the Civil Hospital. The town is intersected by several clean and shady roads, which are extended in all directions into the country around.

Edible Supplies.

The Bazaar contains almost all a Native wants, in the way of grain, vegetables, and fruit. Animal food is scarce, as cows are not allowed to be killed in the State, and no sheep are reared. Fowls and ducks are tolerably abundant. Fresh fish is not procurable, but dried fish is brought from Vingorla. Pork is a common article of food amongst the Native Christians and Seedies.

Water.

The lake furnishes an abundant supply of water, but being fed by several nullas, which convey a large amount of sand, mud, and debris of putrefied vegetation, it cannot be used for other than washing purposes. Drinking water is obtained in abundance from numerous wells in the town and Fort.

Labour.

Labour is cheap: servants' wages are four and five rupees a month, and biggaries two and a half rupees per mensem.

Population.

The population of the town, by the last census in 1856, was nearly 9,000.

The inhabitants are composed of Brahmins, Hindoos of other castes, Mussulmans, Native Christians, Portuguese, and Seedies, the Hindoos being most numerous.

Geographical Position.

The Sawunt Warree State forms the Southern part of what was formerly known by the name of the "Konkun Puttee," or the territory lying between the Seyadree range of Ghauts and the sea. It is comprised between parallel 15° and 17° of N. latitude, and 73° and 75° of East longitude.

Boundaries and Extent.

It is bounded on the North by the Karlee river, and the Salsee mahal of the Malwan talooka of the Rutnagherry zillah; on the East by the line of the Ghauts; on the South by the Terikhol creek and the Portuguese possessions; and on the West by the Vingorla mahal of the Rutnagherry collectorate. This principality is divided into three divisions, viz. Warree, Banda, and Kodal. It contains an estimated area of about 1,000 square miles, and yields a gross revenue of (Rs. 1,56,000) one lac and fifty-six thousand rupees. There are 226 villages in the whole district, numbering 28,327 houses.

Government.

It is an independent principality, not tributary to any power, having for its nominal ruler a Sir Desaee or Rajah named "Khem Sawunt Bhonsle Raje Bahadoor"; but, in consequence of the uniform disaffection and faithlessness of the engagements of its rulers with the British Government for a number of years, and the continued rebellious condition of its subjects, it has been for the last twenty years under the management and superintendence of the British Government, through the instrumentality of a Political Superintendent.

General Features.

The country presents the same general features as are to be found in the greater part of the Southern Konkun, except that the jungles are more dense, and the hills are generally very steep and inaccessible, particularly as they approach the Ghauts; the district is interspersed with hills, some forming prolonged ridges, whilst others are isolated. These continuous ranges extend in every direction; many form extensive prolongations, terminating in sharp ridges, whilst others assume a variety of shapes and sizes, having peaked or waving summits, covered with dense and impenetrable jungles. At some places they terminate in sharp precipices, at others in gradual slopes; they vary in their elevation, aspect, connection, and grouping. The range of height of the hills varies from 500 to 3,000 feet.

Soil.

The nature of the soil is principally a light sand, full of stones and gravel, incapable of yielding the superior kinds of produce, such as cotton, tobacco, gram, wheat, jowarree, and bajree. For revenue purposes the land is divided into two kinds, the Jeerayut or *arable*, and the Bagayut or *garden land*. The Jeerayut comprises the following:—the surd, or land producing a monsoon crop; the gimwus, or land cultivated by irrigation in the dry season; the veedul, or land producing the two grains called kooleed and ooreed, either during the monsoon or where water can be had during the dry season. The Bagayut comprises two kinds, the narul or cocoanut plantation, and the sooparee or betelnut plantation.

Natural Products.

The natural products are rice and the inferior grains, such as natchnee, wurree, hureek, til, moong, &c., which are cultivated in the high lands and amongst the hills in considerable quantities. Cocoanuts and sooparees are produced, but excepting in these two last mentioned products, the country does not yield sufficient for its own consumption, and grain of all kinds is annually imported from the Deccan in large quantities.

Varieties of Rice and Grain.

The chief varieties of rice are called surd bhat (monsoon paddy), bhat patnee, bhat sallee, tandool ookree or juhajr pohe, and the tandool soornee, or fine rice. Besides rice, the more important grains yielding revenue are naglee (Cynosurus corocanus), wureeya, hureek (Paspalum frumentaceum), sawé (Panicum frumentaceum), rall (Panicum Italicum), kooleed (Glycina tomentosa), ooreed (Phaseolus mungo), moog (Phaseolus), wurne (Phaseolus radiatus), toor (Cytisus cajan), chowleea (Dolichos), alsoonde (Budge), til dunge (Sesamum Indicum), til murde (Sesamum Orientale), tag [hemp-seed] (Cannabis sativa).

Lately the plantation of sugar-cane has been introduced, and the produce is annually increasing; it is now grown in some 20 villages. The coffee plant thrives very well in this district. Mr. Spencer, late in medical charge, has planted some 40,000 trees; they are now a year old, and they look very flourishing. Money laid out in a plantation would soon yield a large profit, land and labour being very cheap, and the land-tax merely nominal. When the trees are full-grown, each is supposed to be worth one or two rupees. Cocoanuts and sooparees or betelnut are the only products of the State which are exported to foreign markets.

Irrigation.

The means of irrigation are the rains for the monsoon crops. During the dry season the land is irrigated by means of water raised from the nullas, wells, and tanks, and thus rendered capable of yielding a dry-season crop. The water from the nullas is conducted into and through the fields and gardens by means of narrow water-courses. The water of the wells and tanks is generally drawn by a lat,

which is a long beam or spar supported by a perpendicular forked post, with a bucket attached to one end by means of a long bamboo, and a weight at the other sufficient to raise the bucket when full of water. These lats are worked by one man, and the water thus drawn emptied into a water-course at the mouth of the well, and conducted to all parts of the fields.

Mode of Cultivation.

Rice, naglee, wurree, &c. are chiefly cultivated, the former on the plains, the latter on the hilly lands. Before sowing the rice the land is prepared by burning bushes and leaves on it, and then ploughed, and the rice sown. As soon as the plants are high enough for transplanting, the fields are properly thinned, and the young plants removed to other fields prepared in like manner. The land for the cultivation of naglee, &c. is prepared by manual labor, as it is generally situated where ploughs could not be used; these lands are not annually cultivated, but allowed to lay fallow for a certain number of years.

Cultivation of Monsoon Crop.

The monsoon crop is raised in a similar manner to that adopted in the neighbouring territories, and is as follows:—In June, after the land has been sprinkled by a few showers, it is sown with rice, which is then ploughed, or rather scarified, into the soil. The plough, which is a very primitive implement, is worked by a pair of buffaloes, and a man to direct and drive. The plants shoot up after a few heavy falls of rain; they are then allowed to grow for a month, and after the soil has become quite soft, they are pulled up in little bunches, and planted at distances of from eight to ten inches from each other in the other soil, which is previously ploughed, and sometimes cleared of grass by the ala or rake. The process of planting and transplanting being thus completed, the land is afterwards only weeded from time to time. The reaping is performed between the months of October and November, by the verla or reaping-hook. The crop is left in the field, where it is spread out to dry more perfectly; it is afterwards tied up in sheaves, and built into a stack. After a month or so the threshing commences. A small piece of hard ground (sometimes a rock) is selected, which is well cleaned and

swept; the sheaves are then beaten against the ground. This is continued until the whole of the grain has been separated from the straw; the latter is then put by for the cattle and thatching purposes. The winnowing now follows, which is done by filling a flat basket (soop) with the grain, and slowly emptying it upon the ground from as high as the upraised arms can hold it. The agriculturists of this country are possessed of 16,886 ploughs and 33,773 bullocks employed in cultivation.

Forests.

The Warree State is everywhere covered with densely thick jungle and timber, amongst which are the teak, blackwood, and kher. The teak forests are of no great extent, and the trees as yet of but moderate size. The inferior trees yielding wood are phunus (Artocarpus integrifolia), cultivated, sirus (Mimosa serissa), kinjul, ayen (Pentaptera coriacea), jamba (Eugenia jambosa), patphunus (wild Artocarpus), assun (Physalis flexuosa), keenuce, anjun (Hardwickia bineta), veeraee or nagin, nurum, kosum, nanna, bewla or paleasun, jambul (Syzygium jambolanum), oondeen (Calophyllum inophyllum), sewun.

Mineral Resources.

The only mineral product is iron ore, which is found in each of the divisions of the State, though not in any very great abundance. The iron is pronounced to be of good quality. In 52 villages foundries (such as they are) exist. The iron thus produced is almost entirely consumed within the State for manufacturing implements, and for agricultural and other purposes. In the year 1855 about 230 candies of iron were produced, of the value of Rs. 4,302-8-0, or about one rupee per maund. Talc of inferior quality, and in small pieces, is found at Kudawul, in the Koodal division, and is used in painting images, &c.

Industrial Resources.

The only manufactures are gold and silver embroidery work on saddle-cloths, horse appointments, and scabbards of swords, native guns, swords, daggers, spear-heads, &c., punkahs, painted toys, sealing wax, and fire-works; but scarcely any of these are exported, and are only manufactured in quantities sufficient to meet the local demand.

Geology.

The geological formation of this district has not been hitherto specially investigated, nor does the information I am about to furnish tend to elucidate the subject. I can only submit a catalogue of specimens collected for the Government Central Museum at Bombay:—

List of Rocks.

Age, Secondary Plutonic Series of India.

1. Mica rock with embedded garnets.
2. Garnets from above.
3. Quartzy rock.
4. Felspar, pink.
5. Felspar, flesh-coloured.
6. Pegmatite.
7. White felspar.
8. Granite, base red.
9. Grey granite.
10. Porphyritic granite.
11. Granite with large mica scales.
12. Syenite, dark grey.
13. Granite, cream-coloured base.
14. Granite, streaky.
15. Granite, rusty base.
16. Granite.
17. Granite, black.
18. Granite, white.
19. Syenite, quartzy crystals in felspar and hornblende in masses.
20. Granite, green base; felspar in red veins, exceedingly beautiful.

Older Metamorphic Series.

1—12. Mica schist.
13. Mica schist with garnets.
14—20. Gneiss.
20—24. Strata contorted by volcanic force.

Economic Rocks.

1. Talc.
2. White clay from decomposing granite.
3. Iron stone.
4. Laterite for building.
5. Black soil.
6. Kunkur.

Botany.

In the absence of any information on botany, I submit a list of the indigenous plants used in the Materia Medica of the Native hukeems :—

No.	Native Name.	Botanical Name.	Part used.	Actions.	Uses.
1	Purree paut.....	.....	Leaves	.....	In measles.
	Bahawa	Cassia fistula	Pulp of pods	Laxative	
	Bal hurda.....	Chebulic myrobolans.....	Ditto	Ditto	
	Ba hudda.....	Beleric ditto	Ditto	Ditto	
5	Awulcattee	Myrobolans.....	Fruit	Ditto	
	Goolvell	Menispermum glabrum	Root	Tonic and astringent.....	Fever and gonorrhœa.
	Kajrah	Strychnos nux vomica	Seeds.....	Tonic and anodyne	Colic, paralysis, & itch.
	Koombiah	.....	Bark	Anodyne	Poultices.
	Koora	Nerium antidysentericum	Ditto	Ditto	Fever and colic.
10	Putcoolee	.....	Flower	Astringent	Dysentery.
	Sap sundee	.....	Root	Ditto	Diarrhœa and dyspepsia.
	Viajoo	Anacardium Indicum.....	Bark	Tonic and astringent.....	Fever and diarrhœa.
	Datura.....	Datura stramonium	Seeds and leaves.	Ditto	Rheumatism.
	Toop kadee.....	.....	Leaves	Astringent	Dysentery.
15	Sone goyeer	.....	Seed	Antacid	Fever and cough.
	Maca	.....	Leaves	Irritant	Rheumatism.
	Moglee yerund ..	.....	Root	Astringent	Diarrhœa and colic.
	Naring	Citrus aurantium	Seed	Astringent and tonic.....	Dysentery.
	Daleemb	Punica granatum	Ditto	Tonic	Ditto.
20	Koomblee	.....	Ditto	Astringent	Diarrhœa and colic.
	Kanjnee	Cardios perimum helicacabum.	Ditto	Irritant	Rheumatism.
	Moulung	Citrus angulata	Ditto	Anthelmintic	Vermes.
	Goda yerund	Ricinus communis	Ditto	Purgative	
	Adoolsa	Justicia gendarussa	Leaves	Expectorant & anti-spasmodic.	Cough.
25	Newdoong	Euphorbia tortilis	Bark	Ditto ditto.....	Ditto.
	Subja	.....	Leaves	Anthelmintic	Vermes.
	Nagur motha	Cyperus rotundus.....	Ditto	.....	Fever.
	Kudoo pudwul ..	.....	Seed and leaves ..	Refrigerant.....	Lotion for eyes.
	Kost kolundun ..	.....	Root	Carminative	Dyspepsia.

30	Ovel	.....	Seed	.....	Astringent	Diarrhœa.
	Bhooe chapa	.....	Root	.....	Resolvent	Mumps and bubo.
	Awdoombur	.....	Ditto	.....	Ditto	Ditto.
	Pangara	Erythrina indica	Ditto	.....	Ditto	Liver complaints.
	Lingoor	.....	Ditto	.....	Astringent	Cholera and diarrhœa.
35	Kalee meeray	Piper nigrum	Seed	.....	Ditto	Ditto.
	Vecundee	Hill aloe	Root	.....	.....	Fever.
	Waola	.....	.....		Counter-irritant	Rheumatism.
	Jammal gota	Croton tiglium	Seed oil	.....	Cathartic	
	Shagool	.....	Bark	.....	Irritant	Rheumatism.
40	Limboo	Citrus limonum	Seed	.....	.....	Fever.
	Agara	.....	Root and leaves.		Irritant	Rheumatism.
	Pallus	Butea frondosa	Root and flower.		Astringent	Gonorrhœa.
	Amba	Mangifera indica	Bark	.....	.....	
	Jambool	Syzygium jambolanum	Ditto	.....	.....	
45	Jaswunt	.....	Root	.....	.....	
	Bharumgee	.....	Ditto	.....	Diaphoretic	Fever.
	Pimplee	Piper longum	Bark	.....	Carminative	Ditto.
	Soont	Zingebar officinale	Root	.....	Ditto	Ditto.
	Sowaree	Bombax malabaricum	Root and bark		Astringent	Dysentery.
50	Bel	Ægle marmelos	Fruit	.....	Ditto	Ditto.
	Pahar mool	.....	Root	.....	Ditto	Dysentery and colic.
	Waleroo	Andropogon muricatum	Ditto	.....	Ditto	Dysentery.
	Ranpurwul	.....	Ditto	.....	Diuretic	Dropsy.
	Punder vasoo	.....	Ditto	.....	Ditto	
55	Cootkee	Helleborus niger	Seed	.....	Ditto	
	Soorwaree hurda	.....	....		Cathartic	
	Pimplee	Ficus religiosa	Root	.....	Expectorant	Cough.
	Vacund	Irispseudacorus	Ditto	.....	.....	Ditto.
	Mahaloong	Citrus medica	Fruit	.....	.....	Colic.
60	Gocurrun	Alietris hyacinthoides	Root	.....	Resolvent	Mumps.
	Pitpapda	Pharnaceum mollugo	Leaves	.....	Antacid	Cephalalgia.
	Gokesoor	Ruellia longifolia	Seed	.....	Tonic	Debility.

No.	Native Name.	Botanical Name.	Part used.	Actions.	Uses.
	Sehowtee.....	.....	Flower	Antacid	Vertigo.
	Aswugund	Physalis flexuosa	Root	Tonic	Debility.
65	Ringnee	Solanum jacquini	Seed	.....	Fever.
	Narvale	.....	Leaves	.....	Ditto.
	Parlee	Bignonia chelonoides.....	Root	Antacid	Vertigo.
	Seewun	.....	Ditto	Refrigerant.....	
	Bal nimb.....	.....	Leaves	Ditto	Fever.
70	Vourung	Embelia ribes	Bark	Anthelmintic	Worms.
	Teegur.....	.....	Root and leaves.	Cathartic.....	Ditto.
	Utee vish	Betulis.....	Root	Astringent	Diarrhœa.
	Shutawuree.....	Asparagus racemosus	Ditto	Tonic	Debility.
	Cuwuch beej	.....	Seed	Ditto	Ditto.
75	Ganjay rookhee ..	.....	Root	Ditto	Ditto.
	Valbeej	.....	Seed	Ditto	Ditto.
	Taleemkhana	Barleria longifolia	Ditto	Ditto	Ditto.
	Sufed mooslee....	.....	Root	Ditto	Ditto.
	Gujree.....	Bignonia suaveolens	Seed	Anthelmintic	Worms.
80	Toolsee	Ocymum sanctum	Leaves	Refrigerant	Fever.
	Drone puspee	.....	Seed	.....	Ditto.
	Tatoo	.....	Root	Astringent	Dysentery.
	Toop karra	.....	Leaves	Ditto	Dysentery & gonorrhœa.
	Kerfud.....	Aloe perfoliata	Ditto	Cooling	Gonorrhœa.
85	Tackala	.....	Seed	.....	Itch.
A 85	Sunkhnee	.....	Root	Cooling	Gonorrhœa.
	War	Ficus indica.....	Bark	Astringent	Diarrhœa.
	Awdoombur	.....	Ditto	Ditto	Ditto.
	Julvate	Ficus indica.....	Ditto	Ditto	Ditto.
	Pairee	Ficus racemosa	Ditto	.....	Ditto.
90	Doorva.....	Agrestis linearis.....	Leaves	.....	Itch.

	Seerus	Pinapis dichotoma	Seed	Diuretic	Dropsy.
	Hulud	Curcuma longa	Root	Ditto	Ditto.
	Teel	Sesamum indicum	Seed	Ditto	Ditto.
	Kummul	Nelumbium speciosum	Root	Refrigerant	Fever.
95	Ooput sool	.....	Seed	Ditto	Ditto.
	Kurrunj	Pongamia glabra	Seed oil	Ditto	Itch and ulcers.
	Kurroo limb	.....	Leaves	Bitter tonic	Fever.
	Neergoond	.....	Ditto	Refrigerant	Itch and ulcers.
	Dant vullee	.....	Root	Ditto	Ditto.
100	Teegur	.....	Leaves	.....	Ditto.
	Gellee	Vangueria spinosa	Seed	.....	Colic.
	Jutta mawsee	Valeriana jatamansi	Root	Antacid	Cough and fever.
	Dorelee	Solanum nachrorhizum	Seed and root	.....	Fever.
	Salwan	.....	Root	.....	Ditto.
105	Pitwan	.....	Ditto	.....	Ditto.
	Bafalee	.....	Root and leaves.	.....	Ditto.
	Cachora	Curcuma zerumbet	Seed	.....	Ditto.
	Indrajuw	Cucumis pseudo colocynthis	Ditto	Purgative	Ditto.
	Bhojee awla	Phyllanthus neruri	Ditto	Astringent	Gonorrhœa.
110	Bore	Prunus Indicus	Ditto	.....	Fever.
	Pashanbhed	.....	....	Antacid	Cough.
	Uculcara	Anthemis pyrethrum	Root	Ditto	Ditto.
	Bebowa	.....	Seed	Escharotic	Piles.
	Chittruk	Plumbago zeylanica	Root	Irritant	Ditto.
115	Kaleree	Vernonia anthelmintica	Seed	Anthelmintic	Worms.
	Bhoee limb	.....	Leaves	Antacid	Vertigo.
	Agusta	Æschynomene grandiflora	Root and seed	Refrigerant	Fever and gonorrhœa.
	Jaswunt	Hibiscus rosasinensis	Root	Astringent	Gonorrhœa.
	Soorun	Arum campanulatum	Ditto	Irritant	Piles.
120	Bhoee Kohala	Cucurbita pepo	Ditto	Tonic	Rheumatism.
	Gool bag	Ipomœa jalapa	Ditto	Purgative	
	Dhowra	Grislea tomentosa	....	Refrigerant	Fever.
	Rue, or Mandar	Calotropis gigantea	Leaves	Anodyne	To relieve pain.

No.	Native Name.	Botanical Name.	Part used.	Action.	Uses.
	Ambaree	Hibiscus cannabinis	Root	Astringent	Diarrhœa.
125	Rewa chinee	Rheum hybridum	Ditto	Purgative	
	Khair	Catechu	Gum	Astringent	Dysentery.
	Chinch	Tamarindus indica.....	Fruit.....	Laxative	Ditto.
	Baluntshep.....	Anethum graveolens	Seed oil	Stimulant	Rheumatism.
	Moorood sheng ..	Helicteres isora	Bark	Astringent	Tanning and Diarrhœa.
130	Dyatecha phul ..	Grislea tomentosa	....	Vermifuge	Worms.
	Shekekaee	Acacia concinna	....	Purgative	
	Bhunkhot	A species of gourd	....	Vermifuge	Worms.
133	Ahulea.....	Sepidum salwun.....	....	Tonic	

Most of the wild animals that usually infest the forests of India inhabit the jungles of this State. Buffaloes are in profusion throughout the district; monkeys abound everywhere. As regards *ornithology,* it may be worth noticing that the common house-sparrow does not exist, nor the common kite. The lake is always the resort of paddy-birds, and one or two other species of grallatores are seen together with the wild palmipedes. The toucan, or it may be the hornbill, is very common in the district. Both noxious and innocuous snakes are common, but poisonous snake-bites are rare.

Rivers.

The rivers in this district are the Gudnudee, which rises near the Ghotga Ghaut, separates the Salsee mahal from the Kulsoolee and Bordwe turufs of this State, and empties itself into the sea North of Malwun. The Karlee river takes its rise in the Hunmunt Ghaut, passes by the villages of Namelee, Mangaum, Koodal, Bamboolee, Bao, Surmul, Neroor, and Chendwun, and falls into the sea South of Malwun, forming for a considerable distance the boundary between Her Majesty's Territories and the Warree State. The Banda river rises in the Ghauts near the Fort of Munohur, flows past the villages of Sangelee, Wotowne, Insoolee, Banda, Kas, Satose, Kowtunee, and Aronda, and empties itself into the sea to the South of the Fort of Terekhole. From Banda towards the sea this river divides Warree from the Portuguese territories. The Tulaora river rises at Wuzrat, passes Hodowda, Tulaora, Toolsee, and Matond, and falls into the sea at Moche Mar, a hamlet of Vingorla. The Tilaree, called also Koodasee river, rises at the Ram Ghaut, crosses the great military road twice, and enters the Goa territory at Muneree. The Kulna river takes its rise at the Tulkut Ghaut, crosses the road at Kulna, and passes into the Goa State. There are also a number of small streams besides the above, which in the rainy season, owing to the proximity of the Ghauts, soon swell into considerable rivers.

Roads.

The principal roads throughout the State are from Belgaum down the Ram Ghaut to the port of Vingorla; from the Deccan by the Tulkut Ghaut to Banda; and from the Goa territory down the Parpolee

Ghaut to Warree and Vingorla; also a branch road through Bowlat and Banda into the Portuguese possessions. A new road from Belgaum to Vingorla *viâ* the Parpolee Ghaut is in course of construction, the Ghaut portion being nearly finished; and it promises to be one of the best roads in the district. A branch road from Warree will meet it near Kulsoolee. There are also numerous cross-roads leading into the Goa territory on one side, and Her Majesty's on the other. The only water communications are by the Terekhole creek on the South, inland as far as Banda, where, however, small boats only can be used at any distance from the mouth of the creek; and by the Karlee creek on the North, as far as Sonowra, near Koodal.

Forts.

There are five noticeable Forts, viz. Munohur, situated about 30 miles NNE. from Warree. It is a solid mass of rock, and is perhaps one of the strongest Forts in India. It constitutes an outwork of the Konkan against the Deccan, to which, however, it is connected by a narrow ridge about two miles long. It is of an angular shape. Its height is about 2,500 feet. Two strong gates guard the entrance, which is approached by a flight of steps cut through the solid rock. Warree Fort (*see page* 143, "*The Fort*"). Koodal Fort, 12 miles NW. from the town, of an irregular shape, erected upon rising ground, but it is a place of no strength, and is crumbling down. Banda Fort lies 9 miles South of Warree, on the left bank of the Terekhole river. It is in a state of dilapidation. Awara Fort, near the Vingorla road, dismantled.

Population.

The population of the Warree State, according to the census, is divided into 1,23,262 agricultural, and 38,962 non-agricultural classes, or men 55,735, women 55,363, children 51,126: total 1,62,224.

Caste.

Hindoos constitute the chief population of the Warree State; they may be divided into four classes, viz. the *Brahmins*, who are generally priests and karkoons; *Mahrattas*, usually soldiers, servants of the State, and cultivators of the soil; *Wanees*, engaged in trade; and *Shoodras*, of the labouring class. The Mahomedan population numbered in 1852 about 3,000; the Native Christians 2,000.

Occupation.

The inhabitants are chiefly cultivators. They are of a warlike race, accustomed to the use of arms from their childhood, and the native army is largely recruited from among the Mahratta Sawunts of this principality. They are an extremely poor, ignorant, and superstitious race, easily led, and ready at any time to follow any leader who will give them a seer of rice a day. They are almost all provided with arms; it is not therefore to be wondered at that insurrectionary movements have at all times been so easily got up in the State, particularly when the country presents such remarkable facilities for irregular warfare, being covered with a dense, almost impenetrable jungle, and abounding in wild and inaccessible fastnesses.

Religion.

The predominant religions in the Warree State are Hindoo, Mahomedan, and Christian; the followers of the last mentioned are Roman Catholics.

Language.

The languages in use are generally the Mahrattee and Urdoo; the latter is spoken by the Mahomedan population. The original language used throughout the State by Hindoos, excepting the higher classes, is impure Mahrattee, and was termed Koodalee, from its being peculiar to the district of that name, and to the Southern talooka of the Rutnagherry Collectorate; but this dialect is now gradually being superseded by a purer Mahrattee. Most of the Native Christians speak a mixture of Mahrattee and Portuguese, neither languages very perfectly spoken, but nevertheless is such as is in general use among the people of a great part of the Goa territory.

Education.

There are three Government vernacular schools established at the three principal towns of the State, viz. Warree, Banda, and Koodal. The Warree school contained, in May 1856, 190 pupils, the highest class of which is said to attain to a knowledge of algebra, geometry, and history. The Banda school is attended by 56 pupils, and the Koodal by 106 boys. A separate vernacular school is also attached to the local corps for the purpose of giving instruction to the regimental recruits, boys, and the nearer relatives of all ranks in the corps. The daily attendance is said to be 120.

Besides the above, from thirty to forty indigenous schools exist throughout the State, and they are attended by about 500 boys. These schools, however, are not permanent, their existence depending upon the circumstances of the inhabitants. From the above it will be seen that about 500 receive a permanent, another 500 a precarious education.

Criminality in reference to Medical Jurisprudence.

On the subject of criminality, in reference to medical jurisprudence, happily there does not appear much scope for report. From the General Report of the Political Superintendent for the official year 1855-56 it appears that heinous offences are by no means common in this State. In that year there occurred only one wilful murder and two homicides; whilst medically there was nothing remarkable connected with them. But it is well known that criminal abortion, infanticide, and concealment of birth exist to as deplorable an extent as in any other Hindoo part of India, and the usual difficulties of detection are attendant here as everywhere else. No cases of suicide and poisoning are recorded. Insanity exists, but not apparently to any striking extent. I have met with six instances, three of mania, and three of dementia.

Stature.

The following table exhibits the stature of the people of this State. It will be seen that the average height of ten women is four feet eleven inches; and the average height of thirty men five feet six inches. All of these are Hindoos, and are natives of the State, their ancestors to the fourth, fifth, and sixth generations were which also. All the measurements were taken by myself with care. It may be observed that one man is 6 feet $10\frac{3}{4}$ inches high, and the shortest 5 feet $1\frac{1}{4}$ inches. The tallest woman measured is 5 feet $1\frac{3}{4}$ inches, and the shortest 4 feet $9\frac{1}{4}$ inches. The upper extremity was measured from the acromion process to the tip of the middle finger; the average length in the male was 2 feet $5\frac{1}{2}$ inches, and in the female 2 feet 2 inches. The lower extremity was measured from the crest of the ilium to the ground on which the person stood; hence its height appears considerable. The average in the male was 3 feet $2\frac{3}{5}$ inches, and in the female 3 feet.

The Height, &c. of Thirty Native Male Adults and of Ten Female Adults of the Warree State.

Number.	Age.	Height.		Length of Upper Limb.		Length of Lower Limb.		Remarks.
		F.	I.	F.	I.	F.	I.	
1	22	5	6¼	2	6⅜	3	3⅓	Sepoys and recruits of the local corps.
2	26	5	6	2	7¼	3	5	
3	22	5	5	2	6	3	3	
4	21	5	5¼	2	5½	3	4¼	
5	23	5	6⅓	2	3½	3	5	
6	22	5	7½	2	7½	3	4	
7	24	5	9	2	8	3	7	
8	22	5	6	2	5	3	5	
9	24	5	6½	2	4½	3	4	
10	24	5	6½	2	4¾	3	4¼	

Number.	Age.	Height.		Length of Upper Limb.		Length of Lower Limb.		Remarks
		F.	I.	F.	I.	F.	I.	
11	28	5	4½	2	5	3	3	Prisoners in the Jail.
12	28	5	4½	2	4	3	1	
13	30	5	5¼	2	6	3	5	
14	25	6	10¾	2	6	3	7	
15	30	5	4	2	4	3	1	
16	40	5	2¾	2	3	3	..	
17	22	5	5¼	2	4¼	3	3	
18	26	5	6½	2	7	3	6	
19	25	5	5¼	2	3¾	3	2	
20	30	5	7	2	7	3	5	

Number.	Age.	Height.		Length of Upper Limb.		Length of Lower Limb.		Remarks
		F.	I.	F.	I.	F.	I.	
21	45	5	5½	2	5½	3	3	Coolies.
22	45	5	1¼	2	4	3	1	
23	22	5	5½	2	6½	3	5	
24	25	5	3	2	5¼	3	..	
25	40	5	9½	2	5½	3	5½	
26	22	5	7	2	5½	3	4½	
27	22	5	5½	2	5	3	4	
28	30	5	5¼	2	7	3	4	
29	35	5	5½	2	4½	3	3	
30	22	5	3¾	2	5½	3	3	

Number.	Age.	Height.		Length of Upper Limb.		Length of Lower Limb.		Remarks
		F.	I.	F.	I.	F.	I.	
1	22	4	9¾	2	3	3	..	Prisoners of the Jail.
2	28	5	1½	2	3¼	3	6	
3	26	4	10¼	2	2¼	2	11	
4	20	4	11½	2	2	2	11	
5	25	4	9½	2	2¼	2	10½	
6	23	5	1¾	2	2	3	½	
7	26	5	1¼	2	4	3	¾	
8	15	5	1	2	3	3	½	
9	24	4	9¼	2	..	2	9¾	
10	40	4	10¼	2	2	2	11½	

Climate.

The climate of Sawunt Warree partakes somewhat of that of Malwan or Vingorla Proper, but it is modified by Sawunt Warree being more elevated and in a higher latitude than those places, and it is generally a little cooler.

Seasons.

The cold season begins about the middle of November, and ends about the middle of February; the sudden transition from the moist warm month of October to the cold dry air of November is disagreeable, and occasionally proves sickly to the thinly-clad native. Then follows the hot weather, succeeded by the rainy season, which commences after the 15th of May, and ends about the middle of October. There are violent North Westers from February to the middle of May, and generally a few showers in April, and sometimes early in May, accompanied with thunder and lightning from the North East, preceded by mists and fogs from the same direction. The regular hot months are March, April, and May.

Temperature.

The accompanying table shows the extremes and differences of temperature for the last seven years; and it will be observed that the range is very considerable.

Extremes and Differences of Temperature at Sawunt Warree, from 1851 *to* 1857.

Months.	1851.			1852.			1853.			1854.			1855.			1856.			1857.			Remarks.
	Max.	Min.	Differ.	Max.	Min.	Differ.	Max.	Min.	Differ.	Max.	Min.	Differ.	Max.	Min.	Differ.	Max.	Min.	Differ.	Max.	Min.	Differ.	
	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	Fah.	
January..	88°	62°	26°	88°	62°	26°	89°	66°	23°	85°	70°	15°	84°	66°	22°	84°	69°	25°	84°	70°	14°	
February	93	64	29	88	64	24	87	71	16	84	66	18	87	66	21	88	72	16	89	70	19	
March ..	95	70	25	90	75	15	90	88	2	85	68	17	85	70	15	94	73	21	90	72	18	
April....	96	70	26	99	76	23	91	81	10	80	72	14	90	71	19	93	76	17	90	75	15	
May	92	75	17	96	76	20	82	76	16	84	75	9	97	85	12	90	77	13	90	77	13	
June....	91	72	19	96	75	21	89	74	15	81	75	6	94	86	8	94	76	18	85	73	12	
July	83	74	9	82	75	7	78	76	2	80	75	5	84	75	9	82	75	7	82	75	7	
August ..	82	74	8	82	75	7	82	75	7	85	77	8	82	75	7	81	74	7	79	74	5	
Sept.....	80	73	7	83	75	8	83	75	8	84	75	9	83	75	8	82	75	7	83	75	8	
October..	83	74	11	85	76	9	85	76	9	86	76	10	84	75	9	85	73	12	85	73	12	
November	83	62	21	85	70	15	85	70	15	84	63	21	83	69	14	84	74	10	80	66	14	
December	90	64	26	83	70	14	84	70	14	85	71	14	84	64	20	84	69	5	87	65	22	

Rain.

The fall of rain during a period of ten years, from 1848 to 1857, is given in the accompanying table. The average fall in June is about 47 inches, in July about 50, in August about 24·5, in September about 12, and in October about 7. The yearly average is about 144·5 inches. The greatest fall of rain was, in 1849, about 177 inches; the smallest quantity, 94 inches, in 1855; the largest fall in any one month occurred in July 1851, amounting to 72 inches; the monsoon commenced very early in 1856, as nearly 22 inches fell in May.

Fall of Rain at Sawunt Warree for Ten Years, from 1848 *to* 1857.

Months.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	Total.	Average.
	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.
January	..	..	..	..	..	..	..	..	..	..	..	..
February	..	..	..	..	..	..	..	..	..	..	..	..
March	..	..	..	..	..	..	..	..	..	..	..	..
April	..	..	..	..	..	..	..	..	..	..	..	..
May.....	..	1·21	0·31	1·70	2·42	1·10	0·70	..	21·72	12·90	42· 6	4·21
June.....	41·70	63·61	49·90	48·15	56·46	35·35	54·89	32·28	47·41	36·40	466·15	46·61
July.....	45·63	45·13	51·52	71·18	45·75	44·89	64·30	35·78	52·10	44·25	501·13	50·11
August.....	36·70	23·83	16·65	22·22	24·88	18·45	17·88	9·25	25·76	50·10	245·72	24·57
September ..	6·77	37·34	5·57	5·28	18·79	11·60	18·63	8·55	3·85	7· 0	123·38	12·34
October	4·37	6·11	7·87	6·17	7·60	0·95	11·50	7·75	9·30	5·55	67·17	6·72
November....	..	..	..	..	..	..	..	..	..	..	..	..
December	..	..	..	..	..	..	..	..	..	..	..	..
Total..	135·17	177·23	131·82	155·30	155·90	112·34	167·90	93·61	160·14	156·20	1,445·61	144·56

Barometer.

No means have been made of the barometrical measurements that have been taken, and no hygrometrical observations have been recorded.

Winds.

The prevailing winds appear to be from NW., WSW., and S., from 15th February to 15th October; from the N. and W. during the rest of the year. The Northerly and Westerly winds blow strong and in gusts.

Jail.

The Jail is an old native building, inside the Fort, originally intended as a granary, but with a few late improvements (for want of a better place) answers the purpose pretty well. It is, however, situated on the lowest level of the Fort, by the walls of which it is surrounded, and hence is almost entirely shut out from currents of air. The building contains six cells, fronted by a small open space; and the guard-room at one end is an upper story, forming the Hospital. The enclosure is 188 feet in length and 87 feet in breadth. The Jail is built of mud and stone, and is roofed over with bamboos and tiles. The means of ventilation are scanty, merely one or two double-grated windows in each cell; the number of prisoners, however, being but few (on an average from fifty to sixty), there is no inconvenience from over-crowding, or from impure air. The Hospital has an upper floor, boarded, lofty, windowed, and exposed somewhat to fresh currents.

Diet.

The usual diet of the prisoners consists of one seer of rice, two ounces of vegetables, one ounce of salt, half an ounce of mussala or curry-stuff, and half an ounce of kokum per diem. The Hospital patients are dieted according to the advice of the medical officer. No difference is made in the diet between labouring and non-labouring prisoners or women. The hours set aside for the meals of the prisoners are 7 A. M. and 5 P. M.

Labour.

The prisoners are not put to hard labor, strictly speaking, but they are made to perform as much work as possible. Out-door labour consists principally of work on the roads, buildings, &c. in the town; a few convicts are employed inside the Jail in making cane and bamboo work. The female convicts are employed in grinding corn, &c.

Clothing.

The clothing allowed to each male prisoner for the summer is a dhotur 5 × 2 cubits, during the winter a kumblee 6 × 2 cubits. The women have a saree and a kumblee. The clothing appears to be sufficient; extra blankets are supplied for hospital use when necessary.

Prisoners are not transferred to this Jail from elsewhere, and very seldom are they sent from hence to another station, except occasionally to Rutnagherry.

Health.

The subject of health may perhaps be best elucidated by an examination of the Dispensary Returns for seven years, from 1851 to 1857, which will show the diseases that have occurred, and the effect of seasons upon them.

TABLE A.

Return of Dispensary Patients attending the Civil Hospital at Sawunt Warree, from the Year 1851 *to the Year* 1857.

Diseases.		1851.	1852.	1853.	1854.	1855.	1856.	1857.	Total.
Fevers	Ephemeral	12	2	..	13	7	1	..	35
	Eruptive	7	4	..	..	..	4	..	15
	Continued	30	11	..	1	..	..	1	43
	Intermittent	522	110	116	87	106	111	71	1123
	Remittent	26	..	2	2	4	3	1	38
	Other varieties	18	..	..	..	..	..	..	18
Small-pox		2	..	..	1	1	..	1	5
Affections of the brain, spinal cord, and nervous system		13	10	21	11	18	13	11	97
Paralysis		18	6	3	2	3	9	..	41
Delirium tremens		9	2	..	..	..	..	..	11
Tetanus	Traumatic	1	2	..	..	..	..	..	3
	Idiopathic	1	..	..	..	1	2	..	4
Affections of nose and ear		21	3	2	9	19	14	9	77
,, of mouth and fauces		10	9	3	3	3	7	6	41
,, of air-passages		7	1	8	2	..	..	20	38
,, of lungs and pleura		15	49	54	31	31	36	20	236
Phthisis pulmonalis		23	1	..	1	1	2	..	28
Affections of the heart and vascular system		..	1	..	1	..	..	..	2
,, of the liver		13	1	..	1	..	2	4	21
,, of the stomach and bowels		202	365	245	248	258	297	130	1745
Dysentery		319	182	77	43	113	40	29	803
Cholera spasmodica		24	3	..	61	..	..	190	278
Affections of the spleen		16	1	2	..	1	1	..	21
Dropsical affections		22	2	5	3	6	7	7	52
Beri-beri		4	..	..	..	..	..	..	4
Rheumatic affections		440	193	148	83	129	143	106	1242
Affections of the urinary organs		13	2	1	..	4	9	..	29
Venereal	Primitiva	67	15	4	..	5	3	2	96
	Consecutiva	32	1	..	1	..	..	..	34

Gonorrhœa	127	14	8	6	2	8	2	167
Affections of the generative organs	5	..	..	..	..	..	..	5
Hernia	16	1	1	..	3	1	..	22
Affections of the rectum and anus	6	4	1	3	3	2	3	22
,, of the bones and joints	3	..	..	..	..	..	1	4
,, of the general system	13	3	..	..	..	1	1	18
Scurvy	..	..	..	..	..	..	..	..
Old age and natural decay	2	..	1	..	1	..	1	5
Entozoa	..	..	..	..	..	..	2	2
Dracunculus	5	1	..	..	1	..	..	7
Tumores	48	16	5	3	7	8	1	88
Hydrocele	6	..	..	..	..	..	..	6
External inflammations	28	9	3	7	20	14	16	97
Erysipelas	7	1	..	..	1	2	3	14
Ulcus	305	92	95	49	88	93	46	768
Fractures	6	8	3	1	1	2	6	27
Dislocations	21	2	3	1	..	..	..	27
Wounds and Injuries — Head and spine	10	20	2	2	8	12	..	54
Wounds and Injuries — Face, neck, and throat	8	6	..	..	1	..	1	16
Wounds and Injuries — Thorax	..	..	..	1	..	..	..	1
Wounds and Injuries — Abdomen	..	..	..	..	..	..	1	1
Wounds and Injuries — Loins and pelvis	8	3	..	..	..	..	..	11
Wounds and Injuries — Extremities, superior or inferior	14	32	25	32	53	61	43	260
Punishment	..	..	6	..	..	..	..	6
Diseases of the Eyes — Acute	18	9	5	5	3	7	5	52
Diseases of the Eyes — Chronic	5	..	..	..	..	1	..	6
,, ,, Skin	179	47	36	12	85	57	24	440
Lepra græcorum	3	1	..	..	3	5	..	12
Hydrophobia	..	..	..	..	..	..	..	..
Snake-bite	1	..	..	..	..	..	..	1
Poisoning	4	2	1	..	1	..	..	8
Miscarriage	..	..	..	..	1	3	..	4
Labour	..	1	2	..	2	6	4	15
Uterine diseases	1	..	..	1	..	..	..	2
Total	2736	1248	888	727	994	987	768	8348

TABLE B.

Showing the Nature and Amount of Disease, in each Month of the Year, as taken from the Dispensary Returns of the Seven Years, 1851 *to* 1857.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Fevers — Ephemeral	3	1	..	2	1	6	..	..	5	7	6	4	35
Fevers — Eruptive	..	1	1	2	2	..	1	..	1	..	2	5	15
Fevers — Continued	3	4	..	2	2	3	1	5	2	9	10	2	43
Fevers — Intermittent	106	74	86	82	124	126	133	81	88	78	87	58	1123
Fevers — Remittent	..	4	1	..	4	4	..	11	2	4	6	2	38
Fevers — Other varieties	..	..	..	..	..	..	..	..	5	8	5	..	18
Small-pox	..	..	1	2	2	..	..	..	..	..	..	..	5
Affections of the brain, spinal cord, and nervous system	11	9	7	10	8	4	6	11	10	7	4	10	97
Paralysis	1	3	3	8	8	..	2	2	4	5	3	2	41
Delirium tremens	1	2	1	2	1	..	..	2	..	..	1	1	11
Tetanus — Traumatic	1	2	..	..	..	..	..	..	..	..	..	..	3
Tetanus — Idiopathic	..	..	..	..	..	1	..	1	1	..	..	1	4
Affections of nose and ear	9	6	2	10	4	4	1	6	8	8	8	11	77
,, of mouth and fauces	4	6	1	2	2	1	1	6	2	2	8	6	41
,, of air-passages	..	..	7	5	6	7	1	5	3	4	..	..	38
,, of lungs and pleura	24	17	11	17	15	15	28	32	20	18	15	24	236
Phthisis pulmonalis	1	2	2	1	10	..	..	4	2	5	..	1	28
Affections of the heart and vascular system	..	1	..	..	..	..	..	..	..	..	..	1	2
,, of the liver	2	1	2	..	3	1	..	1	3	4	3	1	21
,, of the stomach and bowels	147	109	132	120	150	134	273	139	130	139	130	142	1745
Dysentery	50	50	34	37	84	84	68	121	89	51	51	84	803
Cholera spasmodica	1	2	16	60	43	33	85	18	9	7	2	2	278
Affections of the spleen	2	2	..	..	2	..	1	5	4	4	1	..	21
Dropsical affections	3	7	5	2	7	3	2	2	8	6	2	5	52
Beri-beri	..	..	..	..	..	..	..	..	3	1	..	..	4
Rheumatic affections	152	122	118	53	114	135	123	61	88	99	104	73	1242
Affections of the urinary organs	5	1	1	1	1	..	2	6	4	5	2	1	29
Venereal — Primitiva	8	12	4	5	12	2	9	6	12	16	6	4	96
Venereal — Consecutiva	..	2	1	4	2	5	2	5	7	5	..	1	34

Gonorrhœa	23	73	1	4	17	3	3	9	14	8	7	5	167
Affections of the generative organs	..	..	..	..	..	..	..	1	2	2	..	..	5
Hernia	4	2	2	4	2	..	..	2	2	..	2	2	22
Affections of the rectum and anus	1	3	1	2	1	..	4	2	3	2	1	2	22
,, of the bones and joints	..	1	..	..	..	..	..	..	3	..	..	..	4
,, of the general system	..	3	..	..	..	..	..	7	5	2	..	1	18
Scurvy	..	..	..	..	..	..	..	..	..	..	..	..	..
Old age and natural decay	1	..	1	..	..	..	..	..	2	..	..	1	5
Entozoa	..	..	1	..	..	..	..	..	..	..	..	1	2
Dracunculus	..	2	1	..	..	..	1	..	3	..	..	..	7
Tumores	8	10	1	5	5	3	..	11	7	15	11	12	88
Hydrocele	..	2	2	2	..	..	..	..	..	..	..	..	6
External inflammations	6	6	1	6	5	2	1	12	17	12	13	16	97
Erysipelas	..	2	2	2	..	..	1	2	2	2	..	1	14
Ulcus	56	69	80	59	89	90	57	61	46	54	56	51	768
Fractures	..	1	1	1	..	..	1	1	7	3	4	8	27
Dislocations	4	10	4	3	2	..	..	..	1	1	2	..	27
Wounds and Injuries — Head and spine	3	6	8	5	8	1	2	..	7	6	4	4	54
Wounds and Injuries — Face, neck, and throat	..	5	..	1	2	..	..	1	3	2	2	..	16
Wounds and Injuries — Thorax	..	..	..	..	..	..	..	..	..	..	..	1	1
Wounds and Injuries — Abdomen	..	..	1	..	..	..	..	..	..	..	..	..	1
Wounds and Injuries — Loins and pelvis	..	..	3	..	..	..	..	1	4	2	1	..	11
Wounds and Injuries — Extremities, superior and inferior	19	12	40	45	30	14	18	20	19	15	17	11	260
Punishment	..	..	..	..	..	..	..	..	6	..	..	..	6
Diseases of the Eyes — Acute	5	10	2	2	3	3	3	3	1	5	9	6	52
Diseases of the Eyes — Chronic	1	2	..	..	..	..	..	..	1	..	2	..	6
,, ,, Skin	40	44	86	36	46	33	30	20	18	30	11	46	440
Lepra græcorum	..	..	1	3	..	..	..	2	3	1	1	1	12
Hydrophobia	..	..	..	..	..	..	..	..	..	..	..	..	..
Snake-bite	..	..	..	1	..	..	..	..	..	..	..	..	1
Poisoning	1	..	..	3	2	..	..	1	..	1	..	..	8
Miscarriage	1	1	1	1	..	..	..	..	..	..	..	..	4
Labour	1	1	1	1	3	..	3	..	..	4	1	..	15
Uterine diseases	..	..	..	1	..	..	..	..	..	..	..	1	2
Total	708	705	677	614	822	717	863	686	686	659	600	611	8348

Table A.—The total number of persons treated at the Dispensary during seven years has been 8,348, making a yearly average of 1,192. The largest amount of sickness is from affections of the stomach and bowels, being 1,745. The diseases next most frequent are rheumatic affections, and intermittent fever, being respectively 1,242 and 1,123; then dysentery 803; ulcers 768; diseases of skin 440; wounds and injuries 343, of which 260 were of the extremities; epidemic cholera 278 (190 of which occurred in the last year, 1857); affections of the lungs and pleura 236, and lastly gonorrhœa 167, and venereal disorders 130. Of the class "fevers" 38 only of the remittent type, and 15 only of the eruptive form. The number of cases of paralysis were 41; diseases of the brain none; tetanus 7 cases; enlargement of the liver and spleen are not frequent, neither are dropsical affections, nor Beri-beri. There were 22 cases of hernia, and of entozoa only 2 cases are recorded. Guinea-worm does not exist in this district: 7 cases recorded were in foreign residents; of fractures and dislocations there were 27 of each, only 1 instance of snake-bite, and none of hydrophobia. There were 8 cases of poisoning, chiefly from eating the leaves and seeds of nux vomica, which grows wild all over the district. Fifteen females applied for relief in labor, and 4 for miscarriage. Of diseases of the eyes 58 cases are recorded, of which 6 only were chronic. Affections of the heart are very rare, and phthisis pulmonalis is not much met with. There appears to have been an unusually large amount of illness in 1851, three and four times that of other years; and in 1852 the illness was considerable.

Diseases, in the order of frequency.

Table B.—The largest monthly total for the seven years is 863 in July, and the smallest 600 in November. The increase in July appears to be chiefly owing to epidemic cholera occurring in that month. With reference to the more important class of diseases, intermittent fevers are most prevalent in the hot months of May, June, and July, least so in December; in the other months of the year their numbers vary but little. Remittent fevers prevail in August; inflammation of the lungs

Amount of Sickness as respects each month of the year.

and pleura occurred most frequently in July, August, December, and January; diseases of the stomach and bowels were most frequent in July, and least so in February; dysentery was most prevalent in August, and least so in March. When cholera broke out, it was prevalent from April to September; the largest number of cases occurred in July. Rheumatism is prevalent in every month, the smallest number of cases occurred in April and August.

VIII.—TOPOGRAPHY OF SHOLAPORE.

By J. C. SYLVESTER, Esq., Civil Surgeon.

Extracted from the Civil Annual Report.

Sholapore is situated in latitude 17° 40″ N. and longitude 75° 59″ E., on a gently undulating plain, which presents nothing different in its characteristics to the general surface of the Deccan. The country around is flat and very deficient in vegetation and in timber of any size, presenting an almost uninterrupted level, there being no high ground in the vicinity; it is, consequently, entirely exposed on all sides to the winds which blow at the different seasons of the year. The elevation above the sea-level I have been unable to ascertain exactly, but it must approximate to 1,800 feet. The climate is very healthy, and, with the exception of the months of March, April, and May, is agreeable, the equability of temperature throughout the year being very observable. To this, and also to freedom from malaria, the general exemption from epidemics and indigenous diseases may be, in a great measure, attributed. The seasons of the year may be divided into three: the hot, wet, and cold seasons. The hot season commences in the middle of March, and continues until the first fall of rain, which usually takes place in the latter end of June; from this time till the latter end of October may be called the wet or monsoon season; and from the latter end of October till the middle of March may be denominated the cool season. This division is of course liable to variation, one year frequently differing considerably from another. The months of March, April, and May are uniformly hot: the mean temperature during this period is 86°; the climate is rendered oppressive at this season by the prevalence of hot-winds, which blow from the East in March, and from the West in April and

May. The nights, however, are usually cool, as the hot-winds cease, for the most part, after 9 P. M. The fall of rain varies considerably; the average quantity (calculated from the fall of the last twenty years) is 26 inches. It, however, sometimes amounts to as much as 40 inches, and has been as little as 18 inches. The rain usually falls in showers of short duration, seldom exceeding a period of a few hours at a time. The climate during the rains is very agreeable, as the moisture is not excessive, whilst the change from the dry, stifling atmosphere caused by the hot-winds of the previous months is most remarkable. During this season Westerly winds prevail, veering occasionally to the S. and N., and blow strongly for several weeks. The mean temperature of Sholapore during the wet season is 79°. Great cold is seldom felt in the so-called cold season: the mean temperature for the months of November, December, January, and February is 73°. The following tables will afford more accurate information regarding the fall of rain and the mean temperature of the climate.

Table of Fall of Rain for 5 Years.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average fall of Rain for the Year.
	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In. ct.	In.ct.	In.ct.	In.ct.	
1853.....	..	..	..	..	..	3·43	4·81	11·23	4·87	·20	3·80	..	
1854.....	..	..	..	..	1·12	2·60	7·56	3·81	8·25	6·46	·58	1·20	
1855.....	..	·33	·47	·10	· 2	3·86	·55	·38	2·14	5·80	..	..	In. ct. 25·84
1856.....	..	..	·92	·20	5·52	4·55	1·41	7·96	·89	2·21	· 7	· 4	
1857.....	·6	..	·37	·31	6·78	3·86	3·86	1·14	10·9	3. 1	4·66	..	
Average Fall of Rain in each Month	·1	·6	·35	·12	2·68	3·66	3·53	4·90	5·24	3·53	1·52	·24	

Table of Mean Temperature for 5 Years.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1853.....	74·5°	79·5°	86·0°	87·0°	91·0°	84·5°	79·0°	81·0°	80·0°	80·0°	77·0°	72·5°
1854.....	77·0	76·5	83·0	91·0	91·5	87·0	79·5	81·0	79·0	78·0	76·5	73·0
1855.....	73·5	78·0	83·5	88·5	91·0	86·5	82·0	80·5	81·0	81·5	76·5	72·5
1856.....	75·0	80·0	84·5	92·0	88·0	82·5	82·0	82·0	78·5	77·5	75·0	72·5
1857.....	75·5	79·5	83·5	85·5	85·5	82·5	81·5	79·5	79·0	78·0	72·0	70·0
Mean of each Month ..	75·0	75·6	84·0	85·8	88·8	84·6	80·8	80·8	79·4	79·0	75·4	72·0

Mean Temperature for the Year, 80°.

[The following description of the geology of Sholapore is contributed by Assistant Surgeon G. C. Birdwood, M.D., and has already appeared in the Bombay Quarterly Review, Vol. XIV. p. 328.]

"At Sholapore we find the country an open jungle, rising and falling in long tame lines, the ground swell of the vast ocean of trap uninterruptedly flowing round it. Solitary turwur trees diversify it, and numerous mud villages, the sites of which are marked in the landscape by umbrageous topes, rising amidst black ploughed expanses, and breadths of staple eatage, and other economic cultivation waving dark green, save where intervened by the livelier verdure of rice fields following the courses of the more irriguous nullahs. The undulations of the eruption are but slightly elevated above the rest of the plateau, and just as portions of roughened sea are heaped above the plane of its repose. Some of these trap waves are mere mounds of the rock, covered with a rusty rubble or mohrum, its own debris; others of greater amplitude are capped with black or brown soils, patched here and there with deep violet or jasper red. Earths similarly diversified fill up the intermediate troughs. The escarps are scarred with innumerable runnels, winding along the clefts of the rocks, while through the less resistant soils in the hollows the gathered torrents have ploughed deep and straight channels for themselves. The black is the cotton soil or regur of the Deccan. It covers the most level portions of the camp, and is only a more advanced stage of the brown earth, which is obviously derived by disintegration from the ferruginous rock on which it rests. On the abrupt hillocks and the slopes of the more continuous uplands it is met with merely as mohrum; but in the depressed tracts it has been accumulated to the depth of many feet in a finely comminuted state. Mixed with decomposed vegetation, and in conditions favourable to the solubility of the alkalies combined with silica in its felspar, it forms a remunerative agrarian soil. The silt deposited in the Fort and Artillery tanks is a mixture of the above soils. On drying it bakes like the brown earth, and fissures like regur, and is less loamy than either, their sand having sunk higher up in the nullah, and collected

there in beds. Numerous molluscs are found in both tanks, chiefly of the genera Unio, Paludina, Planorbis, and Melania; snail shells also, but never containing the animal, and palbably transported from a distance along with the alluvium in which they are embedded. The commonest of the various traps is a basalt, hard, close-grained, and of uniform texture; it rings under the hammer, has a semiconchoidal splintery fracture, and is deeply impregnated with iron, its bluish black colour when fresh tarnishing to rusty brown on oxidation.

"It occurs in two forms, compact and spheroidal. The first is much shattered, being traversed throughout by iron chinks and fissures, and split into regularly layered symmetrical masses, in size from toy bricks to pier blocks. A tendency to a columnar cleavage is often betrayed, as in the floor of the nullah in part of the Collector's offices, and in a knoll beyond the "Artillery burn," where the blasted rock abuts on the road in a series of lunettes, like a bastioned wall. Between the joints plates of kunkur are deposited. The knoll is perfectly arid.

"The nullahs coursing this formation are zigzag, angles from their banks breast the force of the stream, and shelves and ridges along their beds give rise to numerous bars, banks, shallows, and rapids. It yields a most durable building stone, and not difficult to work.

"Globes of basalt are also met with in the neighbourhood, heaped like cannon shot through long ranges, and cemented together by a calcareous deposit, which though massive is not coherent enough to prevent the disruption of the spheres by driving water. Thus a nullah at Sewreegaum, on the Beejapoor road, bedded in a dyke of this structure, is direct and steep. Its sides are transcripts of the cyclopean masonry of Ithaca and Tiryns. They are hung too with quaint festoons of mixed silica and lime, the shapeless nests of rent blocks. Its older floor, worn smooth by the action of the stream, vividly pourtrays a tessalated pavement, each flag being zoned by its white matrix, and variegated by concentric stains, exfoliations, rays, and bosses of harder nuclei.

"Amygdaloid occurs in the Cavalry lines. It is always com-

pact, and three varieties may be discriminated,—a deep violet, having peas and dumbells of opaque white and translacent blue mesotype dispersed through it. The nodules are coated orange yellow; their cells are clean. A pure blue, containing almonds of calcspar, stained pale straw colour, the cavities of which are glazed with a vitreous slag; and lastly a grey lavender, with drosses of prismatic mesotype and empty vesicles, lined yellow and grey, and resembling the apothecia of lichens. Of the porphyries one similar in hue to the amygdaloids has acicular crystals of mesotype and cubes of analcime diffused through a friable base, the other, first seen on the Punderpore road, is a jasper red wackè felted with white felspar and black and orange moles. It is covered by the decomposing layer of a later eruption of basalt. Prone to decay, these last rocks have a smooth mouldy surface, and gentle slopes, and where they predominate towards the north and west of the station, the champaign is of an unruffled calm. The marks of currents having swept the district are patches of regur filling up hollows, occurring isolated over wide extents of rock; and fragments of zeolites, calcspar, and quartz and heulandite geodes brought from afar, and of kunkur, and erratic blocks of the locality, strewn in defined streams over the entire platform."

The soil is of two kinds, black cotton soil, and light sandy; in many places the rock is only slightly covered with soil, and in some parts of the cantonment it crops out from the surface of the ground, becomes disintegrated, and crumbles down from exposure to the air; this is most observable in the nullahs in which the soil has been carried away by the force of the streams during the rainy season. The soil is capable of high cultivation in many parts of the cantonment, and both the climate and soil are favourable to the growth of most English vegetables; want of water offers the principal obstacle to a more extended system of agriculture and horticulture than at present exist.

The prevailing winds are East, veering to the S. and N. during the cold season; Westerly in the dry season, and from S. to W. in the monsoon.

The supply of water is liable to considerable variation, as it depends almost entirely upon the amount of rain which falls during the monsoon; the principal supply is afforded by two large tanks, one being in the immediate neighbourhood of the town, the other between the Infantry and Artillery lines; there are many wells also both in the cantonment and in the town. Most of these, however, become dry in the hot weather. The principal supply of drinking water is obtained from a never-failing spring in the neighbourhood of the Artillery lines, the water from which is of most excellent quality. Much distress is frequently felt by the inhabitants of the town during the hot season in consequence of the scarcity of water, the wells being dried up, and the water in the tanks so low and unwholesome in quality, that they are compelled to resort to the abovementioned spring, which is distant from the town about two miles. Some means of retaining the rain-water is much needed, which at present runs to waste.

The natural productions of Sholapore do not differ from those met with in most other parts of the Deccan, and consist of the different kinds of grain used by the native population, as jowaree, bajree, dhall, gram, wheat, and the oil-producing plants, such as linseed, curdee, tillee, and castor, &c. Cotton is grown in the Southern parts of the district, and many of the natives of the town are employed in manufacturing it into various common articles of clothing. There is a great scarcity of timber, which is brought from long distances, and consequently is sold at a very high price.

Jail.

The Jail is situated about a mile from the cantonment, in a Northerly direction, and in the immediate vicinity of the town; the situation is dry and open to the South and East; the soil light sandy. It is surrounded by a stone wall 17 feet high, which encloses a space 260 feet long by 170 feet broad, comprising an area of 44,200 square feet, in which is erected the accommodation for the prisoners, consisting of eleven wards or cells contained in six separate buildings, 3 on the East and 3 on the West, each 3 running parallel with each other from East to West, with a centre walk extending from the entrance on the South to the Northern extre-

mity of the Jail. Each of these cells (with one exception) is divided to the height of 7 feet 10 inches from the ground into two equal walls by a centre wall extending the whole length of the building, 50 feet, with a breadth of 2 feet. Each ward is 10 feet in width, and from the floor to the ridge-pole 16 feet; each ward contains, therefore, about 6,425 cubic feet of air, with a superficial space of 500 square feet. From this disproportion of superficial area compared with cubical contents of air, not more than 25 prisoners can, consonant with comfort, be accommodated in each ward. When this number are confined, only 20 feet is allotted to each individual, who, although confined to so narrow a space on the surface, enjoys 257 cubical feet of air. Each cell is surmounted with a large ventilator, and is also further well ventilated on three sides by barred windows and doors. Every ward opens out from the centre into a yard containing 1,630 square feet of surface. Each yard is divided from the other by a brick wall 7 feet high, 2 thick, and extending from East to West to a length of 72 feet. Of these wards only 9 are at present occupied by prisoners, one on the South East having been set apart for weaving operations, and another on the South West appropriated for a grain store; the Southern division of this building was, while in course of erection, diverted from the original design, and converted into six solitary cells, each cell measuring $10 \times 7 \times 12\frac{1}{2}$, and affording its inmate 875 cubical feet of space. These nine wards are capable, therefore, of accommodating 200 male convicts, allowing $22\frac{2}{9}$ for each ward; a much larger number could not well be disposed of without interfering with the present arrangements, trespassing upon the system of classification now kept up, or producing some discomfort amongst the prisoners.

Hospital.

The Hospital is the first building on the right on entering the Jail, it being situated in the South East angle. It is well ventilated through the centre of its roof, and on three of its sides with open barred windows; there being one on the West, three on the North, and three on the South. Its dimensions are, from the floor to the ridge-pole, 15 feet, length 36 feet and breadth 16 feet, the side walls are

11 feet in height, and thus the contents in cubic feet of atmosphere are 7,488, and 576 the number of superficial square feet of flooring. An iron cot being provided for each patient, it will not well admit more than 16 prisoners without the risk of their being unduly crowded. It is sheltered on the South by a verandah, at the extreme end of which, on the West, is the entrance; at the East end is another door opening into a small room 10 × 16, used as an office, and occasionally as a dispensary.

Solitary Cells.

In addition to the solitary cells above described, there are 16 others: 12 on the South-East, opposite to the Hospital, and 4 at the North end of the centre wall. The latter 4 being thus situated in the most public part of the Jail cannot well be termed "solitary"; the 12, however, on the South-West of the Jail fall more properly under this denomination, and are those generally selected for this kind of imprisonment. They form externally a rectangular compact mass, placed as they are in two parallel lines, of 6 cells in each, with a passage between. Light and air is chiefly admitted from the North and South through large gratings in the upper parts of the doors. Their seclusion is almost perfect, there being a dead wall running from East to West along their front on the North; and the curtain wall itself forms a similar, but more effectual, screen on the South. Their capacity in cubic feet is 700, viz. 10 × 7 × 10, with 70 square feet of chunam flooring. They are further ventilated by small gratings and other perforations at the top and bottom of walls on their North and South sides. They are provided with terraced roofing. The four cells on the North are also terraced, and ventilated through small iron gratings, recently fixed in the centre of the ceiling of each cell, these measuring 7-10 × 7-9 × 10 = 490 cubic feet, and containing only 49 square feet of flooring, are manifestly the smallest cells in the Jail. The whole of the buildings contained in the Jail are built of pucka bricks, and roofed with tile; the wards and cells are raised about one foot from the ground level. Urinals are furnished to each courtyard, which communicate with a covered drain running outside the external wall of the Jail, and terminates in a nullah at some distance.

Diet.

The diet of the prisoners is laid down in the following table, in which also is specified the quantities allowed to the labouring and non-labouring prisoners :—

Names of Articles.	For all male Convicts actually on hard labour.			For all classes of Prisoners not actually on hard labour.		
	lbs.	oz.	dr.	lbs.	oz.	dr.
Bajree, jowaree, wheat, rice, flour, either	1	8	0	1	3	0
Toor dhol	0	4	0	0	3	0
Fresh green vegetables	0	4	0	0	4	0
Condiment composed of turmeric, garlic, coriander seeds, and chillies	0	0	8	0	0	8
Firewood, dry, (damp wood not to be given, or if necessary in monsoon 8 oz. more)	2	0	0	2	0	0
Salt for every ten men	0	3	0	0	3	0
Cocum, tamarind, or other vegetable acid	0	0	8	0	0	8

I am of opinion that the quantity of food allowed is ample, and the quality supplied good. In cases of sickness it is of course modified, at the discretion of the Civil Surgeon. From 10 to 11 A. M. and from 4 to 5 P. M. are the hours set apart for the prisoners' meals.

Employment.

The prisoners are chiefly employed on out-of-door labour, such as building, carpentry, gardening, conveying stone, &c. for building purposes; and a small proportion are engaged in in-door work, such as weaving and preparing materials for the loom. The work to which the prisoners are subjected is by no means excessive or likely to prove prejudicial to their health, but on the contrary is sufficient to keep them in health, without inducing over-fatigue or exhaustion. The hours of labour are from 6 until 10 A. M., when an hour is afforded for their morning's meal. Their day's labour terminates at 4 P. M., when another hour is devoted to

their evening's repast, after which their fetters are closely inspected, and they are locked up for the night.

Once a week, on Sundays, they are taken to a tank about a mile distant from the Jail, for bathing purposes.

Clothing.

To such convicts as may require it, clothing is issued twice a year, in April and October. The clothing allowable to each prisoner per annum is 1 cumlie, 2 dhoters or cholnas, 2 short-drawers, 2 cotton caps, and 2 ungrekurs or close jackets; and should it appear to the Civil Surgeon that more is required by any individual prisoner, in consequence of ill health or susceptibility to cold, it is granted.

Transfer.

Few prisoners are transferred from other Jails to the Sholapore Jail, but of those prisoners who have been transferred from other Jails I have usually observed that their health has continued good, unaffected by the change.

IX.—TOPOGRAPHY OF TANNA.

By A. V. WARD, Esq., Civil Surgeon.

Extracted from Civil Annual Report.

The town of Tanna, the Hoozoor station of the zillah of the same name, is situated on the Eastern shore of the island of Salsette, on the bank of the creek which separates that island from the mainland. It consists of a long narrow street (Tanna proper), running parallel to the creek, and forming the bazaar and its five adjoining villages or suburbs. At the last census, taken I believe in 1851, it contained a population of about 12,000 souls, which it is supposed has not greatly increased during the interval that has elapsed. To the Southward of the bazaar is the Railway station, and to the Northward is an Esplanade, on the outskirts of which are situated the European residents' houses, the Church, Fort, Barracks, Hospitals, &c. The surrounding country is remarkably hilly, but to the North, North East, and South, the town is comparatively open to the breeze; to the Westward there is a long range of hills running in a direction from North to South, which completely intersects the island, and, in some places, attains a height of 1,500 feet above the level of the sea. To the Eastward, again, is another, but a shorter and lower range, the valley between the range in which the town is placed being about four miles broad. By the peculiar conformation of these hills, the town is completely shut out from the cool Westerly sea-breezes, and as the hills are but thinly wooded moreover, the exposed masses of volcanic rocks radiate heat to a considerable extent, elevating the temperature in the plain, and giving rise to that oppressive heat during the hot months of the year for which Tanna has become so notorious.

The year under report has been remarkable as well for the salubrity as the comparative coolness of its hot and rainy seasons: the maximum range of the thermometer in the shade was

102°. This was on one day only in April, during the prevalence of a strong Northerly breeze. The minimum for the same month was 74°, and the mean 88°. In May the maximum did not exceed 96°, the minimum was 82°; during both these months with the exception of only a few days strong Southerly winds prevailed, and though the temperature was high, there was an absence of that excessive oppressiveness of the atmosphere which usually obtains at that season. December was the coldest month, the minimum range being 60°, while the mean of the whole month was 73°. The rains commenced at the end of May with the usual atmospheric disturbances; the quantity gauged that month, however, was small—only 64 cents. During the first fortnight of June the weather was fine, but about the 20th the rains set in steadily, nearly 19 inches having been registered in the month; the principal fall was in July, the register showing as much as 39 inches 71 cents. The total fall for the year was 92 inches 3 cents, being rather below the average of the preceding five years, which was 110 inches. Both smallpox and cholera have visited Tanna during the year, but happily their ravages were not extensive; the former prevailed during the first three months. The disease, however, did not assume a virulent form, and the mortality was insignificant. A few cases of cholera only occurred among the townspeople at the commencement of the rains, though the disease prevailed epidemically in some parts of the zillah to an alarming extent, and was attended with a proportionate mortality. From returns forwarded to the Police authorities, it would appear that as many as 2,151 cases of cholera are reported to have occurred throughout the Tanna Collectorate during the year 1856. In the island of Salsette alone there were 1,022 cases. Of those who received medical treatment (1,388 in number), 520 died, while among the remainder (763) who were not treated, as many as 594 deaths occurred. I observe that Dr. Winchester, the then Civil Surgeon of Tanna, in his annual report for 1847, remarks that "the inteiligent natives ascribed the cause of the absence of epidemic cholera in that year, and in 1841, to the prevalence of Southerly winds, and the absence of the strong Northerly winds which

usually blow during the hot season," so that it is not unreasonable to suppose that the comparative immunity from the scourge which the inhabitants of Tanna have enjoyed during the past year may have been brought about by the operation of a similar cause.

The prison accommodation at Tanna comprises two buildings about half a mile apart,—the Town and Fort Jail. The former is in the heart of the town, close to the creek, and between the bazaar and the Railway station. It is a square enclosed by a high wall, and divided within also by high partition walls into three principal compartments; the largest of these contains the cells for male prisoners, cook-houses, &c; the second contains a large work-shed and store-rooms; and the third is subdivided into three other compartments, in one of which are the solitary cells, in a second the female prisoners are lodged, and the third is allotted to the debtors. The cells are several detached buildings, varying in size, and containing two or three rooms each; they are built of stone, have tiled roofs, the windows being secured by iron bars, and provided with shutters; the ventilation is susceptible of improvement, which could be effected by the construction of one or more apertures on the roofs, having well raised tiled roofs over them, to prevent the ingress of rain, such as the solitary cells and the buildings in the Fort Jail are provided with. The floors of most of the buildings are well raised, and are dry; those appropriated for the use of the female prisoners and debtors, however, are not so during the rains: water lodges in the yards, and I have observed that the floors were cold and damp. There is nothing objectionable in the construction of the solitary cells that I am aware of. They are about twelve feet square, and have each a courtyard in front of similar dimensions, to which the prisoners are allowed access from daylight until 8 A. M. Ventilation is provided for by two apertures, one in the door, and the other on the roof, and the floors are well raised and dry. The privies for the male prisoners are close to the boundary wall facing the creek, into which the filth is conveyed by means of a short open drain. From the solitary cells and women's privies all offensive matter is removed twice daily

by the sweepers, the sinks are afterwards well sluiced with water and sprinkled with chunam. The cells in this Jail are estimated to lodge 549 prisoners, allowing to each a space of 24 superficial feet. Nothing approaching to that number, however, have been located there during the past year: the average daily number has been under 200, so that there could be no complaint on the score of over-crowding. All female prisoners, debtors, prisoners without labour, and those awaiting trial, are lodged in this Jail. There is no Hospital establishment; the male prisoners when sick are removed to the Fort Jail Hospital, and the women are treated in their own cells during epidemics, or when unusual sickness prevails it has been customary to detach from the Fort Jail Hospital one of the assistants with a supply of medicines, to be at hand in cases of emergency. Happily this has not been needed during the past year.

This Jail has long been pronounced unhealthy, and there cannot be a doubt that the selection of its site was a most unhappy one; its proximity, on one side to the creek, which at low water exposes a large surface of mud, the receptacle of every species of filth, and the resort of numbers of the inhabitants for natural purposes, and on the other to a large tank replete with vegetation, and usually dry during the hot weather, together with its imperfect ventilation, by reason of its high partition walls, alone suffice to condemn it. For some years past, the accommodation afforded has been taken advantage of to a very limited extent, and notwithstanding some improvements which have recently been effected, such as lowering a few of the partition walls, and constructing drains through the damp yards, it is to be hoped, should the Jail be not altogether abandoned, that a similar prudent course will be persevered in for the future. The old Porguese Fort, abutting on the creek, is now the Fort Jail. The Barracks and bungalows erected for the use of the European garrison some years ago have been converted into the prisoners' cells; they are strong stone buildings, with tiled roofs, are well raised, dry, and well ventilated; altogether there are 13 rooms or cells in this Jail (exclusive of the Hospital), capable of accommodating 524 prisoners, on the scale of 24 superficial feet; each

cell, according to its size, has one or more urinals for the use of the prisoners during the night; they are pucka built, and thoroughly cleaned out daily, all ammoniacal effluvia being removed by the aid of chunam. The ground within the fortifications is elevated somewhat above the level of the surrounding plain, and is divided by partition walls (which, however, are not so high as to obstruct ventilation) into four compartments, one for the convicts and the Malays, and the others for the remaining prisoners. The former class are always confined to the precincts of their own yard, and not allowed to mix with the other prisoners. All other prisoners are permitted to associate during the day, no attempt having been made to classify the prisoners according to the degrees of guilt; the same applies to the female prisoners. The Fort has two portals, the principal one, on its South Western face, opening on to the Esplanade, and the other on its Eastern, opposite to the creek. Over the latter there is a large substantial building, which was formerly the Commandant's residence, and is now the Jail Hospital; it consists of a central square portion containing five rooms, and of a large, wide, verandah, closed in with venetians and glass windows, running round three sides of the square. The former is built on, while the latter projects over and without the ramparts, being supported by several lofty stone columns. To the Southward of these again are several other rooms, running along the ramparts, and used as store-rooms, cook-houses, &c.; and to the Northward (access being had to it by a covered passage of some forty yards long) is the Hospital privy, the filth from which is received into a stone-built sink situated close to the inner wall of the rampart, and is carried away by a deep open drain (pucka built) passing under the wall, and well out into the creek; the sink being thoroughly sluiced daily with water raised from a well contiguous to it, and the drain being washed out by the tidal currents, all offensive water is speedily removed, and scarcely any stench is perceptible. The Jail Hospital, I conceive, is admirably adapted for its purpose, and has every advantage that could be desired for such a building, being isolated from the body of the Jail, well raised, dry, and freely ventilated; it is capable of

accommodating, without inconvenience or over-crowding, from 50 to 60 patients.

The following Diet Table is that in use at the Tanna Jail, full diet being allowed to all labouring, and the low diet to non-labouring prisoners :—

	Rice, wheat, or rice, bajree.		Dholl	Vegetables.	Curry-stuff	Salt.	Firewood.	Cocum or Tamarind.
	lb.	oz.	oz.	oz.	drs.	drs.	lbs.	drs.
Full	1	8	4	4	4	$2\frac{1}{4}$	2	4
Low	1	3	4	4	4	$2\frac{1}{4}$	2	4

In addition to the above daily allowance, half a pound of mutton is issued to each prisoner twice a week, and the medical officer has full liberty to order such increase or extra diet as he may deem necessary in individual cases. The prisoners have been encouraged by me at all times to complain of any insufficiency or bad quality of the food ; and whenever such complaints have been found reasonable, the circumstance has been brought to the notice of the Judicial authorities, which has invariably led to a speedy removal of the cause. The prisoners are told off into messes of from 10 to 20 each, and one of each mess is directed to cook for the rest. At day-break the cells are opened, and the prisoners are set to work until 10 A. M., when the first meal is taken, one hour being allowed for the purpose ; from 11 to 4 P. M. work is again the order of the day ; at the latter hour the second meal is taken, and by 6 P. M. all the prisoners are again incarcerated for the night. Labour is both in-door and out-door, and is in all cases either useful or remunerative; in-door comprises weaving, platting, oil-pressing, while the out-door consists of stone-breaking, road-making and repairing, &c. The labour is in no instance such as likely to injure the health of the prisoners, and in fact is scarcely ever deserving the term "hard labour," to which the men are sentenced. Clothing is issued

twice a year, about May and November, that is, at the commencement of the rains, and again on the setting in of the cold weather. At each distribution the allowance is 1 kumblee, 1 bundee or jacket, 2 punchas (one worn round the loins, and the other across the shoulders), and 1 cap. This applies to the long-term prisoners; all, however, on admission, should their own clothing be old or insufficient, are supplied from the Jail depôt. It seldom happens that prisoners are transferred from Tanna to other Jails, but a few convicts for transportation are received from nearly every Jail in the Presidency to await means of transport to their destination; besides these, several batches of 50 short-term prisoners have been forwarded to this Jail from Bombay. The men have generally been in good health, and in no instance that I have observed can it be said that the transfer has had an injurious effect on their health.

REPORT ON THE SANITARIA OF THE POONA DIVISION OF THE BOMBAY ARMY.

By C. MOREHEAD, M.D., Acting Superintending Surgeon.

Presented by the Director General Medical Department.

It will save unnecessary repetition and the risk of misapprehension if, at the commencement of this report, the sense in which certain terms are used is explained :—

1*st.*—By "*Deccan Hill climate* or *station*" is meant an altitude of from 4,000 to 4,500 feet on the Western Ghaut range or its Easterly projecting spurs, between about 20° and 15° N. latitude.

2*nd.*—The term "*Deccan table-land*" is restricted to that portion of it between 20 and 15 N. latitude which is within about 60 miles of the Eastern side of the Western Ghauts, and which has a general elevation of from 2,300 to 1,700 feet. It is necessary to be thus precise in indicating the sense in which the term Deccan is used in this report, because at localities more remote from the Ghauts the extremes and the range of temperature are greater at all seasons, and the atmosphere during the rainy season is drier.

3*rd.*—The "*cold season*" is understood to extend from the middle of November to the end of February.

4*th.*—The "*hot season*" from the beginning of March to the middle of June.

5*th.*—The "*rainy season*" from the middle of June to the end of September.

6*th.*—The month of October, which has been excluded from this division of the seasons, presents much of the character of the hot season months.

There are two recognized Sanitaria in the Poona Division,

Malcolm Pait on the Mahabuleshwur Hills, established in 1828, and the Hill Fort of Poorundhur in 1852.

Mahabuleshwur Hills.—On the medical topography and meteorology of these Hills there are full and excellent reports by Mr. Murray, published in the 1st, 2nd, and 7th Numbers of the Transactions of the Medical and Physical Society of Bombay, from which the following summary statement of some of the leading qualities of the climate has been compiled :—

Malcolm Pait.	Mean Temperature.	Mean Range.	Mean depression of Wet Bulb Thermometer.	Rain-fall, Inches.	Direction of the Wind.
Cold Season	64·5	13·	10·2	0·11	Easterly.
Hot Season.....	72·8	13·6	13·5	1·09	NE., NNW.
Rainy Season	64·4	3·6	2·2	243·28	WSW.
Month of October	66·6	9·8	6·4	4·58	Variable.
* Annual Means	66·6	9·7	7·8	254·05	

The station Malcolm Pait is situated on the Western slope of the table-land in 17° 56″ N. latitude and 73° 30″ E. longitude, and has a general elevation of about 4,500 feet. The accommodation at present consists of Government quarters for 16 sick officers, and 77 private bungalows.

In the year 1829 a party of invalid soldiers was sent to this Sanitarium, but the selection of cases and of the season was unsuitable. The result was unfavourable, and the experiment has not been repeated. Since that period, however, the annual resort of an average of about 300 visitors, civilians, military officers, and others, with their families, has afforded ample opportunity of determining the qualities of this Hill climate and its influence on the European constitution in health and disease.

* As the month of November has been excluded from the summary, the annual means here given, taken from the original tables, will be found to differ slightly from the means calculated from the sums of the columns of the summary.

Poorundhur.—The Hill on which the Fort of Poorundhur is placed is an off-shoot from the Easterly side of the Western Ghaut range. It is situated in 18° 22″ N. latitude and 73° 54″ E. longitude, and is distant 19 miles from Poona. It is a saddle-backed mountain. The altitude of the highest part of the ridge is 4,570 feet, but that of the lower Fort, in which the Sanitarium is located, is 4,200 feet. The lower Fort occupies a narrow table about a mile in length, projecting from the Northern slope of the mountain.

There are two barrack rooms, which afford accommodation for 100 men, and a very good Hospital, adapted for 40 sick. There are 10 private bungalows, generally occupied in the hot season by officers and their families. A Patchery for ten (10) families and a small female Hospital are in course of erection. The Sanitarium may, therefore, at present, be considered sufficient for 130 soldiers and 10 families.

A good foot-road has been carried round the Hill on the level of the Sanitarium, as well as round Wuzurghur, an adjoining Hill connected at the same level by a narrow ridge to Poorundhur. This foot-road is about 7 miles in extent, and in consequence of its circular character, its position 230 feet below the highest ridge, and the general form and direction of the mountain, there is space for exercise shaded from the sun till 9 or 10 in the morning.

The climate of Poorundhur compared with that of Malcolm Pait has a temperature about 3 degrees higher, and, in consequence of its more inland position, there is greater atmospheric dryness in the months of March, April, and May. The great difference, however, is in the rainy season: at Poorundhur the rain-fall is 72 inches; at Malcolm Pait it is 254. The rain and fog are so incessant at Malcolm Pait that the station is uninhabitable during the rainy season. The Hill of Poorundhur is also frequently enveloped in mist, and though the convalescents remaining there at this season have in general benefited, yet the climate is gloomy, and out-door exercise is often prevented by rain and dense fog.

About 650 sick and convalescents have been received into the

Poorundhur Sanitarium since its establishment. The greater number have belonged to regiments stationed in the Deccan. A proportion, however, has been sent from Bombay, Guzerat, and Scind. The selection of cases and of season has been sometimes suitable, at other times the reverse. It is this mixed experience, both at Poorundhur and Mahabuleshwur, not again we may hope likely to occur, which has created data from which the medical enquirer is enabled to ascertain with confidence the right sanitary use of these Hill climates.

Panchgunnee.—Malcolm Pait is rendered uninhabitable from the middle of June to the end of September by incessant rain and fog, consequent on its position on the Western side of the mountain; but it is to this position also that are due a greater coolness and softness of the climate in March, April, and May. There are localities on the Eastern side of Mahabuleshwur which possess a climate nearly resembling that of Poorundhur, in which the temperature is about three degrees higher than that of Malcolm Pait, the fog less constant during the rainy season, and the rain-fall about 50 inches. Panchgunnee, distant 10 miles from Malcolm Pait, overlooking the valley of Wye, at an elevation of 4,000 feet, is the locality on the Eastern side of which the character of the climate is best known. Notes on the monsoon climate of Panchgunnee have been published in the 3rd Number of the Transactions of the Medical and Physical Society of Bombay.

Singhur, &c.—The Hill Fort of Singhur, distant 14 miles from Poona, is placed on a table about 4,200 feet above the sea. It has an irregular surface, with a circuit of about a mile and a quarter. There are 15 private bungalows, usually rented during the hot season by officers and their families from the Poona and Kirkee Brigade. The climate of Singhur cannot differ much from that of Poorundhur. Between the river Taptee on the North and the 15th degree of North latitude on the South there are probably many situations more or less spacious on the Easterly side of the Western Ghaut range, or on the spurs projecting inland from it, with an elevation from 4,000 to 4,500 feet, which present the same characteristics of climate in the dry and

rainy seasons as Panchgunnee, Poorundhur, and Singhur. But it must be borne in mind, for reasons which will presently appear, that the hot season climates of such localities are 2 or 3 degrees warmer and are drier than Malcolm Pait and other similar positions on the Western or seaward side of the Ghaut range.

The conclusion to which these several statements lead is, that the soldier in this Presidency has not as yet derived much benefit from the Deccan Hill climates; and the practical question which has now to be determined is by what system this benefit, if real and important, may be extended.

The practice hitherto has been to select from among the sick and convalescents in Hospital those men who are not regaining health, or are progressing slowly to recovery. But the climate of these Hills is by no means suited at any season for all cases which come under this description, and at some seasons is unsuitable for them all. It is therefore of the utmost importance that medical officers on arrival in India should early familiarise themselves with those principles relative to the sanitary application of the Deccan Hill climates which past experience has enabled us to advance with tolerable certainty. With the view of facilitating this necessary preliminary object, a memorandum was prepared in May last by the Superintending Surgeon of the Poona Division relative to the Poorundhur Sanitarium. A copy of this document is appended (vide p. 208), and the doctrines inculcated in it may be regarded as equally applicable to other Hill stations of similar altitude and climate.

It will be sufficient to state here as the general result of past experience, that the debilitated soldier, who in the plains of the Deccan, the Concan, Bombay, and Gujerat regains his strength and efficiency slowly, will after the removal of positive disease be much benefited by a Deccan Hill climate in the month of October and in the hot season; and at those Hill stations (as Poorundhur) in which the rain-fall is not more than 70 inches, and the mists, though frequent, by no means continuous, there will be still further advantage to many of this class of convalescents by—after a hot season residence—their stay being prolonged

throughout the rainy season and the month of October. The benefit which may be looked for is this:—The soldier will have become fitted for duty, he will be less liable to fresh attacks of disease, and when attacked the disease will be of milder type. Whereas had he continued exposed to the exhausting hot season of the Deccan or of the Coast, he would have remained inefficient, and have become very predisposed to attacks of the severer forms of tropical disease—those forms which swell the mortality and invaliding rates of European troops in India. The ultimate effect of these Hill Sanitaria applied as now explained must be, in proportion to the degree in which they are used, to reduce mortality and invaliding.

But a large proportion of the class of convalescents adverted to in the last paragraph, if sent to the Hills in the cold or rainy seasons, would run the risk of being injured by the return of their former diseases or by the access of others of similar character. It is therefore necessary that caution and judgment should be exercised not only in the selection of the cases, but also in determining the season.

There are cases of imperfect recovery from some forms of organic disease which, if the opportunity of a sea voyage and change to colder latitudes is not available, may be sent to the Hills in the hot season, if the facilities of carriage are good, with temporary advantage from avoiding the heat of the plains. But for all cases of imperfect recovery from all forms of organic visceral disease the cold and rainy seasons of the Hills are altogether unsuited, and are generally positively and markedly injurious. The evils which result from the neglect of this now well-ascertained truth were apparent at Mahabuleshwur in the experiment of 1829. They have occurred also from time to time at Poorundhur, and have been very frequently observed at the Neilgherry and Himalayan Hill Sanitaria.

The superiority of the Deccan Hill climate is in the month of October, and from March to early in June.

The Deccan table-land has during the cold season a mean temperature of 70°, and a range of 25°. Its climate at this season exercises no injurious influence on the European constitution,

and is less likely to be prejudicial in the conditions described above than the climate of the Hills at the same period of the year.

The Deccan table-land has in the rainy season a mean temperature of 73·7°, a range of 14·6°, and a rain-fall from about 30 to 20 inches. The climate is genial and refreshing. Though the lower temperature of Poorundhur (67·3°) at the same season is an advantage to some convalescents, still in others it is counterbalanced by the gloom and confinement to quarters consequent on the frequent fog and rain. It may therefore under existing data be concluded that the Hill climate in the rainy season has no advantage over that of the Deccan in the neighbourhood of the Ghaut range.

In the hot season the mean temperature of the Deccan is about 80°, the range 25°, the dryness 22·5°, and a hot wind blows throughout a considerable part of the day. At this season the European constitution is apt to suffer from the influence of elevated temperature, and to become more or less debilitated; and convalescence from all forms of disease is tardy and unsatisfactory.

In the 9th Number of the Transactions of the Medical and Physical Society of Bombay there is a paper by Mr. Murray on the climate and diseases of Sattara. It contains much valuable information on the meteorology and general characters of the different seasons in the Deccan, and may be consulted with much advantage with reference to the subject under consideration.

In Bombay the mean temperature of the hot season is 82°, and the range 11°. The mean temperature of the rainy season is 80·8°, and the range 6·2°; the rain-fall is 75 inches; and the atmosphere from the middle of June to the end of September is humid, and often not far from the point of saturation. The hot and the rainy seasons in Bombay are exhausting to the European, and a similar remark may be applied to the same seasons on the Western Coast generally and the low Southern portion of the province of Guzerat.

It appears, then, that the hot season of the Deccan and the hot and rainy seasons of Bombay, the Coast, and Guzerat are

inimical to Europeans, the degree being in proportion to the previous state of debility of those who are exposed to their influence.

The value of the Deccan Hill Sanitaria is restricted to the hot season. The weakly soldier of the Deccan stations with the cold and rainy season in the Deccan, and the month of October and the hot season at a Hill station, has every advantage which the climate of this part of India is capable of affording. The weakly soldier of the Coast and Guzerat stations with the cold season of his own locality and the rainy season in the Deccan, and the month of October and the hot season at a Hill station, has also every benefit from climate which his circumstances admit of.

Hitherto the improvement to health which results from a judicious use of the climates at our command has, in the instance of the soldier, been confined to the small number of Hospital cases for which a change to Poorundhur has been considered suitable. In order to extend the advantage, a modification of system would seem to be all that is necessary. In *addition* to the Hospital cases a per-centage of the men in Barracks and of their families, say of the former from 10 to 25 per cent. (varying according to the necessities of the service), should be selected at Deccan, Coast, and Guzerat stations. The selection should be made by the medical officer with reference to constitution, medical history, and service in India. The men thus selected should leave their stations towards the end of February, so as to reach the Hills at the beginning of March. The Deccan soldiers should return to their stations in the first week of June, if within the salubrious limit, but if belonging to more inland stations, the Deccan soldiers with those of the Coast and Guzerat should be sent to a well-selected Deccan Sanitarium; and all who have been thus circumstanced should return to the Hills in the first week of October, remain there till the middle of November, and then proceed to rejoin their respective stations, so as to reach them early in December.

In this view the Hill stations are regarded merely as hot season Sanitaria, and the establishments and arrangements would

should be organised with reference to this limited object. For the Sanitarium of the rainy season a suitable locality in the Deccan would require to be selected.

By this system the Deccan soldier, whether in Hospital or at duty, would have the advantage every 4th or 5th year of a hot season on the Hills; and the Coast and Guzerat soldier of a hot season on the Hills and a rainy season in the Deccan. It may be confidently anticipated that a sanitary measure of this scope and nature, in connection with a never-failing attention, under all circumstances, to barrack accommodation and the various other matters of detail which relate to the health and welfare of the soldier, would in a few years have a marked effect in reducing the proportion of sick, of mortality, and of invaliding. It cannot be too often repeated that, by maintaining the general health of troops at as high a standard as the conditions of service in a tropical climate permit, not only is present efficiency increased, but the predisposition to disease, and particularly to disease of bad type, may be so diminished as most materially to reduce mortality and invaliding. To what degree this advantage may ultimately be found to reach, future experience must determine; but there can be no doubt that the principles are true, and that a sanitary system founded on their strict observance, and faithfully and judiciously followed for a series of years, must prove of very considerable advantage to the European Army in India, and consequently to the State.

The method now proposed of applying the Hill and Deccan climates for the preservation and improvement of the health of the soldier rests on no new or untried doctrines. The proposition merely aims at extending to the soldier, and to the families of soldiers, a system which has for the last 30 years been successfully followed by civilians and officers and their families; and which by them has been found to include all the benefit which these climates are capable of conferring.

It now remains to state briefly the means by which these views may be, under existing circumstances, most readily reduced to practice. The Sanitarium at Poorundhur should be continued on its present scale and plan for the reception of convales-

cents on sick certificate from regiments in the Deccan. It should be continued as now during the rainy season, so as to admit of further observation of the effects of this season, and of careful comparison of the results with those of the Hospital cases from the Coast and Guzerat, whom, as will presently appear, it is proposed to locate in the Deccan during the rains. Though there can be little doubt that the Deccan monsoon climate is on the whole preferable to that of Poorundhur, still it is very expedient to take advantage of the already organised establishment at this Sanitarium for prosecuting the enquiry further, and finally settling the question to the satisfaction of those who may still entertain doubts on the subject. Poorundhur does not admit of extension as a Sanitarium for *all* seasons, but a *hot* season site may be found on Fitzclarence Point. Considering, however, the limited space on the mountain, even this extension is inexpedient as a permanent arrangement.

For the men selected from Barracks from all stations, whether in the Deccan or elsewhere, and for the Hospital cases from Bombay, the Coast, Guzerat, and Scinde, a hot season Sanitarium should be established on the Mahabuleshwur Hills in the proximity of Malcolm Pait. The Deccan soldiers should return to their stations at the beginning of June, and those from elsewhere should be moved to Sattara for the rains, return to Mahabuleshwur in October, and thence proceed to their respective stations in the latter half of November.

Should it on further experience at Poorundhur, and on comparison with the results at Sattara, appear that there is greater advantage from the monsoon residence on the Hills than existing data seem to suggest, then instead of moving the Coast and Guzerat and Scind soldiers to Sattara for the rains, let monsoon Barracks and a suitable Hospital be built at Panchgunnee, which would thus become the rainy season position of the military Sanitarium on the Mahabuleshwur Hills. There would in this arrangement be merely the cost of original erection. The establishment of the hot season would be available for the rains, whether passed at Sattara or at Panchgunnee. As the Barracks at Panchgunnee would not be required for men belonging to

Deccan stations, they would necessarily be on a smaller scale than those at Malcolm Pait. Considering the proximity of Bombay, Poona, and Sattara to Malcolm Pait, the many advantages possessed by the Western side of the mountain, and the fact that a well-proved Sanitarium has long existed there, and assuming that the views expressed in this report on the true use of these Hill stations are accepted as just, then there need be no delay in erecting Barracks at Malcolm Pait. For should it afterwards be proved that there are advantages in a residence during the rains at such positions as Panchgunnee, which it is desirable to secure, no unnecessary outlay will have been incurred in erecting Barracks at Malcolm Pait, for it must be always remembered that the Western side of the mountain has advantages in the hot season over the Eastern side, which it would be unwise to throw away; and as respects the cost incurred at Sattara in carrying out the measures suggested for immediate adoption, it cannot under any circumstances be lost, for there is little risk of Barrack accommodation proving excessive at a station healthy like Sattara, and otherwise not unimportant.

Should, however, the distance to Mahabuleshwur be found inconvenient to regiments in the Southern Mahratta Country or in Khandeish, or, after the railway lines are completed, to those in Central India, then other Hill stations may be sought for North and South of Mahabuleshwur in the Ghaut range itself or on the spurs that project inland from its Easterly side; it being borne in mind that if the Sanitarium is for the hot season alone, then a Westerly position on the Ghaut range is very important, but that if the rainy season is to be included, then a station on the Eastern side of the Ghauts, or more inland on the projecting spurs, must be sought for, and the full advantages of the Deccan Hills in the hot season be in some measure sacrificed.

Though the sanitary advantages to be derived from the Deccan Hill climates, and the means by which they may be effected, have now been considered, there yet remains an important question to discuss with reference to the full benefit attainable from change of climate within the limits of the Bombay Presidency.

It has been argued in this report that the chief use of these Hill Sanitaria is confined to the hot season, and to the acceleration of convalescence from disease that has been removed, or of recovery from disease which is merely functional; but that for individuals affected with chronic organic disease benefit from the hot season at a Hill station is only occasional, and at other seasons in such cases the Hill climate is generally positively injurious. It is from organic visceral disease, primary, or complicating or consecutive on the various types of fever, that the greater part of ordinary mortality in India results. It is from these same forms of disease, after they have passed into a chronic state, and also from chronic rheumatic affections, that the great proportion of invaliding in India proceeds. The climate of the Hills in the cold and rainy seasons is injurious in all these forms of disease, and the climate of the Deccan table-land in the cold season is also often unsuitable. It is therefore important to enquire whether in such cases, stationary or retrograding in the cold season in the Deccan, there is any prospect of advantage from change of climate, short of a voyage to sea and return to colder latitudes. It may be with confidence replied that the climate of the Coast, about the latitude of Bombay, from the middle of November to the end of February, with a temperature of 74·8°, and range of 14°, and without the atmospheric dryness of the inland upland stations, affords this advantage.

A cold season Sanitarium suitably placed on the Coast, and accessible with little fatigue, would be frequently of much utility in the management of cases of organic disease which are retrograding or stationary or slowly convalescing in Deccan Hospitals in the cold season. They would recover more rapidly, and become more surely fitted for transference to a Hill station in the hot season, and, in some cases, life might be saved, and invaliding prevented. A sea-coast Sanitarium, then, on a small scale, may be regarded as an important part of the sanitary system of this Presidency. But in order to the safe application of the principle on which its utility rests, it will be very necessary that medical officers, on arrival in India, should early become well acquainted with the state and stages of disease for which it is

appropriate, and that the locality be selected with reference to accessibility and facility and comfort of transport.

On the subject of a Coast Sanitarium it may be useful to remark that, under the improved state of general health which will accrue to the soldier in India from an improved sanitary system, including the avoidance in the hot season of the heat of the plains by resort to Hill stations, the proportion and severity of visceral organic disease and of rheumatic affections will, after a time, become so diminished that gradually the necessity for change to the sea-coast will be lessened. This result may be expected for the same reasons that it is anticipated that mortality and invaliding will, by these same means, become very materially reduced.

Though this report has reference to the Deccan, and to troops for which the Deccan Hill Sanitaria are available, still it may not be altogether inappropriate briefly to allude to other Hill climates and troops in other parts of India.

The general principles which have been advanced are applicable to all localities and to all European troops in India, for they tend to one leading practical object, viz. the maintenance of the greatest degree of health and efficiency for the ordinary contingencies of service in a tropical country. This end is to be attained by avoiding, as much as possible, unhealthy localities and seasons, such as localities with malarious characteristics, the hot season all over India, and the rainy season in many parts of it.

The advantages which are, in some measure, peculiar to the Bombay Presidency are:—

1*st*.—Hill stations which, from elevation (4,000 to 4,700 feet), proximity to the sea, and safe approach at all seasons, afford a cool retreat from the heat of the plains in the hot season, without the risk of injury from cold and wet.

2*nd*.—A considerable extent of country on the Deccan table-land possessing in the rainy season a climate salubrious and refreshing.

3*rd*.—Facilities for the establishment of Sanitaria on the sea-coast in suitable latitudes.

Whereas the sub-Himalayan Hill stations, with elevations from 4,200 to 7,400 feet, are of unsafe approach at some seasons, and present, in greater degree than Mahabuleshwur and Poorundhur, the disadvantages of the cold and rainy seasons; while during the hot season, owing to distance from the sea and other causes, their climates are not so temperate, equable, and dry. Thus the unfavourable hot and rainy seasons of the adjoining plains are ill provided against by these Sanitaria. There is no healthy monsoon climate, and no facility of access to a suitable sea-coast.

The approach to the Neilgherries is, at some seasons, unsafe, but there are stations at different elevations and on different sides of the mountain, which, with the Mysore table-land and a sea-coast, though of low latitude, give to the Madras Presidency in considerable degree the advantages adverted to in a preceding paragraph with reference to that of Bombay.

The problem which has been kept in view in preparing this report has been, how to fit the European soldier for the maximum of efficient service in India with the minimum sacrifice of health and of life. The attempt has not been made to enquire by what means he may attain to the full physical constitutional vigour of his native land and of the other countries of the colder latitudes of the globe, simply because this condition is incompatible with the circumstances in which he is placed. The question has, at different times, been proposed, whether a regiment fresh from Europe located at an elevation of 7,300 feet, and in a climate such as that of Ootacamund on the Neilgherry Hills, would not retain much of its European vigour. Doubtless it would, a deduction, however, being made on account of the rarefied atmosphere. But this regiment would not be efficient for the contingencies of service in India. If suddenly called to the plains for service in the hot season, it would soon show a heavy sick list, and a rapid loss of vigour and stamina would ensue. Let us suppose the service to be concluded, and the regiment, exhausted by heat and fatigue and sickness, moved back to Ootacamund, and the result would be much mortality and invaliding from congestive, inflammatory, and organic visceral

disease. The proof that this is no fancied picture will be readily found in what takes place under the ordinary circumstances of troops fresh from Europe arriving at the commencement of the hot season; and in what has taken place between the years 1840 and 1850 on the transference to the Himalayan Hill stations of several European regiments weakened by service, climate, and disease.

There is no antagonism between the Hill climates of India and a voyage to sea, followed by a residence in the higher latitudes. The states of disease for which the latter is required are usually unsuited for the former. The Hill climates can never be regarded as a substitute for a voyage to Europe or to Tasmania, but their judicious use will render the greater change less frequently necessary; and will improve the general health and increase the efficiency of the European soldier in India.

MEMORANDUM ON THE SANITARIUM AT POORUNDHUR.

BY C. MOREHEAD, M.D., Acting Superintending Surgeon, P. D.

[19 miles distant from Poona, latitude N. 18·12, longitude E. 73·54, altitude 4,200 feet.—Established in 1852.]

1. *Table showing the Atmospheric Pressure, the Temperature, the Dryness, the Rain-Fall, and the Direction of the Winds at Poorundhur.*

	Barometer.	Thermometer.			Dryness, Difference between Dew-point and Thermometer.	Rain-fall, average of six years.	Direction of Winds.
		Mean.	Mean Maxima.	Mean Minima.			
						Inches.	
January	26·022	66·8	71·0	61·8	17·3	0· 5	SE. NW. W. NE.
February	26·023	73·3	76·6	66·6	24·4	0·30	Variable.
March	25·940	76·7	81·0	69·6	26·4	0·20	NW.
April	25·958	78·1	83·0	70·6	28·3	0·50	NW.
May	25·883	72·9	78·4	68·0	12·1	5·70	NW.
June	25·795	69·8	80·0	65·4	3·2	10·18	NW.
July	25·806	66·9	70·8	65·2	1·1	22·98	SW. and NW.
August	25·837	65·4	68·2	64·4	0·7	16·34	SW. and NW.
September ..	25·844	67·4	72·6	65·4	2·1	7·39	NW.
October	25·946	71·2	74·2	67·0	10·6	6·54	SE.
November ...	26·041	69·3	73·2	65·2	18·8	0·67	SE.
December ..	26·011	64·1	69·8	59·2	13·2	1·36	E. and SE.
Means..	25·925	70·1	74·9	65·7	13·2	72·21	Total Inches.

The Pressure, Temperature, and Dryness are taken from the Report for the year 1852-53, *and are, therefore, to be regarded merely as an approximation. The Rain-fall is the average of six years' observation ; the greatest was in* 1854, *viz.* 97·24 *inches, the least in* 1856, *viz.* 44·76 *inches. The hill is more or less covered with fog in June, July, August, and September,—in greatest degree in July and August.*

2. The object of this Sanitarium is to promote the restoration to health and strength of soldiers who have become debilitated from the effects of climate, or from recurrences, or from long duration of various forms of disease, and thus to increase their efficiency, lessen their liability to suffer from severe types of disease, and add to the probabilities of lengthened service.

3. These beneficial results occur with greater certainty in convalescents, in whom there exists no internal organic disease, or marked tendency to it. It will, therefore, be found that the young soldier derives more benefit from the climate of Poorundhur than the soldier of ten years' service and upwards in India.

4. From the commencement of the month of March to the middle of November is the season during which these advantages will be gained. The period of residence required for complete restoration of strength will vary in different cases, and its determination should be left to the discretion of the Medical Officer in charge of the Sanitarium.

5. Though in the class of invalids adverted to in the 3rd paragraph, the hill climate, from the middle of November to the end of February, might not prove injurious, still it possesses no advantages over that of Poona, and the season is suitable for return to this latter station and to duty.

6. The class of convalescents hitherto referred to as likely to be benefited by this climate, are: *1st.*—Those who have become reduced in strength from recurrences of intermittent or remittent fever at Poona, or other adjacent stations, in June, July, August, and September, may, with advantage, reside at Poorundhur from the beginning of September to the middle of November. After this period, however, such cases had better be returned to Poona; for, from the middle of November to that of February, there will be a greater liability to re-attacks of fever in the hill climate than at Poona. *2nd.*—Those who have suffered from recurrences of malarious (intermittent or remittent) fever in October, November, December, January, and February, may be sent to the hill, with every prospect of benefit, in the month of March; the duration of residence in each instance being prolonged or not according to the necessity.

3*rd*.—Young recruits debilitated from attacks of common continued fever (febricula) in March, April, and May, will, after convalescence has fairly commenced, be benefited by the climate of Poorundhur. 4*th*.—Those whose health and strength have become enfeebled from the general effects of a tropical climate or from strumous or allied diathesis, and in whom chronic lymphatic glandular swellings, or indolent external ulcerations are present, are likely to derive advantage from a residence, more or less prolonged, between the beginning of March and middle of November.

7. The months in which invalids may resort to Poorundhur are: 1*st*.—From the commencement of September to the middle of November,—regard being had to the character of the monsoon weather, in different years, in the first named month. From the middle of November till towards the end of February, convalescents of all kinds are probably better in Poona than at Poorundhur; and, as already stated, it will generally be expedient to return to the former station invalids who have been sent to the hill in the September and October immediately preceding. 2*nd*.—Though invalids already at Poorundhur, and who have been resident there for some time previously, are generally improved by the climate of July and August, it is, however, unadvisable to send them there in these months. 3*rd*.—March, April, and May are the months most suitable for the transfer of convalescents to Poorundhur. A greater variety of cases may be sent at this period, and they can have the advantage, if necessary, of a continued beneficial residence of eight months and a half, viz. to the middle of November. In many cases more or less of the climate of March, April, and May is necessary to fit the constitution for deriving benefit from the monsoon months.

8. The more precise application of the climate of Poorundhur will be best explained by a reference to some of the chief forms of disease.

I. Fevers. The convalescent, from all forms of uncomplicated fever, will be benefited from March to the middle of November. Individuals who have suffered from frequent attacks of *malarious* fever are liable to have the disease re-excited—

chiefly in the tertian form—by external cold in the months of December and January: this liability (the degree of predisposition in both instances being assumed equal) is greater at Poorundhur than at Poona; therefore the former locality should, under these circumstances, be avoided in these months. Such individuals are also liable to re-attacks in July, August, September, and October: this liability would seem to be greater at Poona than at Poorundhur, probably in consequence of the great equability of temperature of the latter, not favouring cold as a determining cause, and the more continuous moisture preventing the generation of malaria. Therefore, the predisposed to intermittent fever may pass the rains with advantage at Poorundhur, provided he has resided there a month or six weeks of the hot season just preceding. Convalescents from malarious fever, in whom some degree of *splenic enlargement* is present, may resort to Poorundhur at the suitable seasons without risk of injury, and with every prospect of advantage, provided appropriate care and management be at the same time adopted. A similar remark may be applied to those in whom, with the febrile recurrences, there has been tendency to *hepatic congestion*, provided the disease has not been of long duration, nor the subject of it long resident in India. For it is reasonable to infer that where congestion of the spleen or of the liver is coincident with, and in a measure consequent on, the febrile recurrence, and diminishes or ceases with its intermission, the tendency of a climate which prevents the return of the febrile paroxysm must be gradually to remove the dependent congestions and their consequences, if appropriate medical treatment and management be at the same time had recourse to. It follows, then, from these observations, that benefit from the climate of Poorundhur to convalescents from fever will be contingent on accuracy of diagnosis as respects absence, nature, and degree of organic complications.

II. Dysentery and Diarrhœa. The convalescent from uncomplicated dysentery or diarrhœa may with propriety be sent to Poorundhur in March, April, and May, and his stay there prolonged or not according to circumstances.

III. Hepatitis. Individuals who have recently suffered from attacks of acute hepatitis, and who are consequently predisposed to recurrence, should, as a general rule, avoid this climate at all seasons, though probably there is still room for experiment as to whether the monsoon season at Poorundhur may not, under these circumstances, be useful in young, previously sound, and at the time thoroughly convalescent constitutions.

IV. Cirrhosis. The hill climate is unsuitable for the soldier in whom this condition of the liver is suspected to be present.

V. Dyspepsia. When the symptoms to which this term is applied are related to debilitated state of constitution, or to chronic irritation of the mucous membrane of the stomach, the climate of Poorundhur, with due attention to diet and medical treatment, is in general very useful. When, however, they are dependent on cirrhosed liver, or other allied visceral change, benefit is not to be looked for: such cases, indeed, have been erroneously classed.

VI. Pulmonary Affections. In the incipient and early stages of phthisis, good will probably result negatively in March, April, and May from avoidance of the debilitating influence of the heat of the plains. The soldier, generally of some length of service in India, suffering from chronic bronchitis or asthma, is not likely to be improved by a residence at Poorundhur; on the contrary, these affections are liable to be increased.

VII. Affections of the Heart. Organic disease of the walls or valves of the heart will, it need hardly be observed, derive no benefit. The symptoms consequent on the embarrassed action of the organ will generally become aggravated. Yet there are cases of disease, occasionally erroneously named *Carditis*, characterised chiefly by palpitation, often distinctly traceable to frequent exposure to the sun, or to alcoholic or other intemperance, which may be improved by avoidance of the hot season of the plains. In selecting such cases, however, careful attention to diagnosis is essential.

VIII. Cerebral Congestive, Inflammatory, or Structural Disease is liable to be aggravated by the climate of Poorundhur.

IX. Rheumatism. Cases of pain, with or without slight swelling of the joints, occurring in cachectic constitutions, provided the cachexia is not decidedly syphilitic, often derive benefit if sent to the hill after the beginning of March; and if the improvement has been considerable in the months of April and May, it will probably be increased and perfected by a residence continued during the monsoon months.

X. Secondary Syphilis. There is no quality of the climate of Poorundhur calculated to aid in the eradication of the syphilitic virus. Still, in cases in which treatment has been inefficacious in the plains, and in which the cachexia is rapidly advancing, it may be reasonable enough to expect greater benefit from treatment conducted at Poorundhur in March, April, and May. In some instances syphilitic eruptions have improved during the monsoon months. This climate will also be useful to the debilitated convalescent from syphilis, just as it is in similar conditions of constitution consecutive on other forms of disease.

9. It may be inferred from the general tenor of these observations, that complete restoration to health and strength from a residence at Poorundhur will be chiefly found to occur in the soldier of a few years' service in India, in whom a proclivity to attacks of malarious fever has not become firmly established, and organic disease is as yet slight and remediable in character. If such as respects previous disease be also the conditions of the soldier of ten years' service and upwards, then to him also the climate of Poorundhur will prove very beneficial. The tendency of the advantage thus gained will be to maintain and increase the vigour of the constitution, to render it less predisposed to the severer forms of disease, and thus prolong the period of the soldier's efficient service in India. But when the soldier has served in India ten years and upwards, and during that period has frequently suffered from disease, and the question of invaliding has arisen, then, though it may be of advantage to him to pass at Poorundhur the period that it may be necessary for him to remain in India, still it is not to be expected that residence there will be in any respect, under these circumstances, a substitute for invaliding, or will lessen the number of unfits of this class.

10. The transfer of sick in states and stages of serious disease at the time requiring care and medical treatment, in the hope that these may be conducted with more advantage at Poorundhur, was not in contemplation when the Sanitarium was established; and there has been nothing in experience there since to justify this proceeding, but much to dissuade from it. It is, doubtless, disheartening and unsatisfactory to watch disease progressing, notwithstanding our best efforts to remove it; but this event is not to be remedied by the heedless transfer of sick from station to station. It is to be lessened: 1*st*.—By such sanitary measures in regard to barracks, hospitals, dress, rations, duties, amusements, and judicious use of hill and other Sanitaria, as shall maintain the health and vigour of the soldier at as high a point as practicable, and, therefore, less prone to the severer types of disease. 2*nd*.—By such careful study of the pathology and rational principles of treatment of disease in India as shall teach us to distinguish, at the earliest periods, all serious forms of disease, and to conduct the cure with watchful care and steady judgment.

11. There are forms of disease, as recurring malarious fevers with or without splenic and hepatic complication, idiopathic affections of the liver and bowels, pulmonary, cardiac, nephritic, and rheumatic affections, for which the climate of Poona from the middle of November to the end of February, is not favourable, and for which that of Poorundhur at the same season is still more adverse. For these a Sanitarium on some well-selected site on the sea-coast would be a great boon, and, consequently, a great advantage to the State. It would, further, be useful in those forms of hepatic disease for which both Poona and Poorundhur are unsuited also in the hot months of the year.

*** This Memorandum has been prepared, after full consideration of the Reports of the several Medical Officers, and careful personal inspection of the Sanitarium and of the Invalids at present (May 1858) resident there, in the hope that it may be useful to Medical Officers in charge of European troops, more especially those who have recently arrived in the Poona Division. It makes no pretension of having exhausted or fully developed the subject, and is intended to be suggestive, not dogmatic.

FURTHER OBSERVATIONS ON DRACUNCULUS IN THE ISLAND OF BOMBAY.

BY H. J. CARTER, Esq., Surgeon.

Presented February 1858.

Since my "Note on *Dracunculus* in the Island of Bombay" was communicated to the Society in October 1853, and published in the new series of their "Transactions" (No. 2 p. 45), I have continued to give my attention to the subject when opportunity offered, and have thus been able to correct, to add to, and to clear up many interesting points connected with this entozoon. They are as follows:—

1. What I have described and figured as the œsophagus *(loc. cit.)* is but the sheath of this organ, inasmuch as the latter may be seen within the former, about 1-600th of an inch in diameter. This corrects the apparent anomaly of the œsophagus being larger, instead of smaller, than the intestine, and makes it agree with the so-called "tank-worm," whose anatomy, both individually and sexually, with that of other free microscopic *Filariæ* in the island of Bombay, I have lately been able to determine most satisfactorily.

2. What appears to be the intestine in *Dracunculus* is the hepatic sheath degenerated, within which again is the intestine, about 1-70th of an inch in diameter. This also corresponds with the same organ in the microscopic *Filariæ*.

3. There is not the slightest difference of form in any part of the ovisac of *Dracunculus* indicating that it was once double, and united together in the centre to form the vagina, as in the free *Filariæ*, nor is there any projection, or difference in the size of its calibre, either in the large portion or in its filiform extremities (which are exactly alike), indicative of its having any connection with a vaginal aperture.

4. The ovisac *bursts* through the body just behind the head of the *Dracunculus*, on the extrusion of the latter from the human body, and does not pass through an aperture ordained for the evacuation of its contents, in this or in any other part of the worm.

5. The third or "small papilla" which I described and figured about the mouth *(loc. cit.)*, and through which I wrongly conjectured that the ovisac might have its exit, has a similar one opposite to it; so that there are two prominent and two rudimentary papillæ, if the latter, which are very small and cannot be seen to project above the surface, be papillæ at all.

6. The œsophagus, intestine, and position of the anal aperture of the young *Dracunculus* correspond exactly with the same organs and the position of the anus in the free microscopic *Filariæ;* but no comparison can be drawn between the generative organs in the two, because they are not developed in the former.

7. Very many species of microscopic *Filariæ* abound in myriads in the salt water of the marshes and main-drain, in the freshwater tanks, and in the gelatinous Algæ *(Glœocapsa)* which grow on the sides of old walls and gutters, during the rainy monsoon, in the island of Bombay. Out of several hundred specimens of these, I have met with seventeen distinct forms: viz. seven in the salt water of the marshes and main-drain, of which six are males and females of three species respectively; two in the freshwater tanks, male and female; and eight in the gelatinous Algæ on old walls, among which are six, males and females, of three species respectively.

8. Of these it may be stated that the organology in all is the same, and, so far as the alimentary canal goes, exactly like that of the young *Dracunculus*. The generative organs and position of the vulva are, in round terms, the same in all,—that is to say, the vulva is situated towards the middle of the body (from which departs in opposite directions the double tubular ovisac), and the penis consists of two horny spicules approximated at an acute angle just inside the anus, from whence it is exsertile. In all, however, the variety in form of the head or tail, or both,

serves not only to distinguish the species, but frequently also the sex of the species. In most (probably all) the œsophagus is furnished with a rigid, sharp-pointed extremity, which is exsertile. Lastly, in all, the young are undistinguishable from each other, and closely allied in form to the young *Dracunculus;* the alteration in the head and tail not taking place before the development of the generative organs.

Observations.

These facts show that the alimentary canal is of the same construction in the young and old *Dracunculus* as in the free microscopic *Filariæ* abovementioned; that the ovisac of the adult *Dracunculus* is as symmetrical in its two halves as the double ovisac (so-called "uterus") of the microscopic species, but, from want of a vaginal outlet, is a uniform continuous tube, the diminished extremities of which resemble the diminished extremities of the double ovisac, which are in fact the ovaries; that the bursting forth of the ovisac, therefore, in *Dracunculus* is an inevitable consequence, and has its parallel, according to Van Beneden, in the bursting forth of the "matrix" or so-called "uterus" under corresponding circumstances (that is when it becomes distended with ova) in the Cestoid Entozoa, *Tænia solium;* that the œsophagus in *Dracunculus* being of the same construction as that of the microscopic *Filariæ*, is therefore, probably provided with an exsertile point, which enables it to bore its way through the tissues, after the manner of *Cysticercus*, which is also similarly provided for this purpose; and that this might enable the young of the microscopic species to pass into the human body through the skin direct, or indirectly through the ducts of the sudorific glands, the latter being much larger in calibre (viz. 1-1200th of an inch) than the young *Filaridæ*, which are frequently not wider than a human blood-globule; that from what we now know of parthenogenesis or virgin-generation, the young female microscopic worm might pass into the body already prepared to produce a new brood before the generative organs can even be detected, as Mr. J. Lubbock has

proved,* by showing that the ovaries of *Daphnia* may throw off a number of buds at one time, and a number of eggs at another, both of which may repeat the individual, but probably the latter only (which requires impregnation) can keep up the race; that some of the microscopic *Filariæ* above alluded to have two and four minute papillary eminences projecting from their heads respectively, two of which are larger than the other two, which approximates them still closer to *Dracunculus*; and lastly, that the microscopic *Filariæ* not only seek a habitat (viz. the gelatinous Algæ and decomposing cells of vegetable matter) where they can obtain nitrogenous food and elements of nutrition like those afforded by the human body, but that it has occurred to me frequently to find a *Nais* (whose habitat also is the *Glœocapsa* during the rainy weather) with its peritoneal cavity containing one or more microscopic *Filariæ*, equal in size to those which are dwelling in the same Alga.

It is true that we have not the means of feeding either man or animals with the young microscopic *Filariæ*, to determine if this would be followed by the production of *Dracunculus*, as the abundance of *Cysticerci* in "measly pork" has enabled Küchenmeister, Van Beneden, Siebold, and others, to prove that the latter, when taken internally, are productive of *Tænia* or tape-worm; nor would this be likely to succeed if we did possess such means, since it is more than probable that the embryo which produces *Dracunculus*, whatever it may be, enters through the surface of the body. Neither should we be justified in plastering mud over the human body, to satisfy our curiosity in this respect, knowing the pain which *Dracunculus* occasions, while the experiment seems to be already performed to our hands, as related in my "Note" under reference, where it is shown that out of a school of fifty boys bathing and dabbling more or less throughout the day in a small pond in their enclosure, whose muddy sediment swarmed with the so-called "tank-worm," not less than twenty-one in one year had had *Dracunculus* in more or less plurality, while such was not only not the case in any of the other schools of the island, but in the school of which I have

* Phil. Trans. 1857.

had medical charge for more than ten years, with an average number of 346 children present, only two or three cases have occurred during that time; and microscopic *Filariæ* do not exist, so far as I have been able to ascertain, in the sedimentary deposit of the tank in their enclosure, from which the children of this school are solely supplied with bathing water.

I have only now to add, in support of the inference conveyed by the above remarks respecting the origin of *Dracunculus*, that Professor Siebold took the larvæ or caterpillars of *Yponomeuta cognatella* and other lepidopterous insects, and, having placed them in wet mould which abounded with the embryos of *Mermis albicans*, a worm closely allied to *Gordius*, found, in every instance, that after twenty-four hours the larvæ became more or less infected with these embryos, which had penetrated into their bodies; while the larvæ of *Yponomeuta* being transparent, enabled this sagacious observer to ascertain, by aid of the microscope, that they did not contain any of these embryos before the experiment of bringing the two into contact with each other was performed. Lespés also, while studying the *Termites*, found whole nests destroyed by the embryos of a nematoid worm just like our microscopic *Filariæ* penetrating their bodies and becoming developed in the peritoneal cavity, as in the instance above-mentioned in *Nais*. If, after this, the origin and mode of introduction of *Dracunculus* into the human body be doubted, I can only reply, that I shall be happy to see a better explanation of it. The facts above stated appear to me as conclusive as those of *Cysticercus* producing *Tænia* or tape-worm; and therefore it remains only to determine which of the microscopic *Filariæ* produces *Dracunculus* in Bombay,—a point which the marked forms of these worms respectively might be expected to render not difficult of demonstration. Indeed, it so happens that the so-called "tank-worm" (*Urolabes* palustris*, mihi), which I have taken from the "bathing-pool" of the school mentioned, as well as from other pools, tanks, and collections of dirty fresh water in the island generally, comes nearest to *Dracunculus*.

* A holder on by the tail, which is the character common to all these microscopic *Filariæ*.

The largest specimens are 1-6th of an inch long, bilabiate, with an exsertile, sharp-pointed œsophagus, the hepatic sheath ending some distance from the termination of the intestine; the vulva opens in the female a little in front of the middle of the body, and the anus posteriorly, just before the body terminates suddenly in a whip-like tail, which varies in length, being sometimes almost abortive and curved upon itself. The penis in the male is exsertile from the anus, *very nearly close* to the posterior extremity of the body, which is so obtuse as to be almost truncated. The tail of the young is semi-geniculated at the base, and there is a gland close to the anus, as in the young *Dracunculus*.

ANNUAL REPORT

OF THE

EUROPEAN GENERAL HOSPITAL,

For 1857-58.

BY A. H. LEITH, M.D.,
Surgeon.

Presented by the Director General, Medical Department.

At the close of the official year 1856-57, there remained of the 1,401 patients that had been admitted 82 still under treatment; of these 76 were eventually discharged, and 6 died; these deaths being added to those that had already occurred from among that year's admissions, give a total of 82, or a ratio for the year 1856-57 of 5·8 per cent.

During the year just closed there were 1,870 admissions, which is 469 more than in the preceding year, and 686 more than the average of the previous 10 years. The deaths were 135, or deducting the 6 belonging to the previous year's admissions, they were 129, and on 1st April there remained 120 still under treatment. Until these remaining cases are closed the exact ratio of mortality cannot be known, but it is far above the average ratio, and will perhaps be found to equal the highest that there has been during the preceding 10 years.

The severity of the cases that came under treatment was unusual, and the ratio of the fatal to the recovered was affected also in some degree by the necessity of excluding from the crowded wards many slight cases that would have been taken into hospital in other years.

From *Fevers* the admissions were 272, or 33 more than in the preceding year, and 92 more than the mean of the ten years. The deaths in the return under this head are 8, but of these, one

is not attributable to that cause, as the patient had long recovered from fever, but remained in hospital with tubercular disease. Of the others there were five in which there was little opportunity for the successful use of remedial measures, as one of them died in 8 hours after admission, one (complicated with icterus) in 11 hours, a third in 20 hours, and other two within 23 hours. The others were a man of 78 years of age, in whom the fever was complicated with bronchitis: he died 4 days after admission; the other, an Overseer of labourers at Vehar, who was admitted with grave head symptoms, died five days after being brought to hospital.

The body was examined after death in six of the seven cases, and there were found—

Serum to amount of ℥iss to ℥iii in arachnoid and cerebral ventricles in	5
Great turgesence of the vessels of the encephalon in	5
Lungs more or less gorged with blood in	4
Kidneys congested in	3
Spleen enlarged in	3
Liver congested in marked degree in	2
Fatty liver, weighing 100 ounces	1

The admissions for *diseases of the Lungs* were 91, or 17 more than in 1856-57, and the deaths were 11, of which 9 were from phthisis pulmonalis, one from bronchitis, and one from pneumonia in a sailor who died 10 hours after admission, and in whom carditis also was present.

For *diseases of the Liver* 69 were admitted and 13 died, these numbers being in excess of those of the preceding year, and the ratio of deaths being much higher. The return shows 5 cases of *Icterus*, but besides these, icterus co-existed with other ailments in several other patients. Two cases of *Hepatic Abscess* discharging through the lung were admitted. One of them, an artilleryman employed in the Arsenal, recovered and returned to his duty; the other, a seaman, who left hospital prematurely when recovering from this form of the disease, relapsed, returned to hospital, and died under a complication of his hepatic disease with small-pox.

Of the whole 18 fatal cases of hepatic disease there were —

Seamen	10
Ship-painters	2
Commissariat warrant officer	1
Artilleryman	1
Military pensioner	1
Civil engineer	1
Plumber	1
Shoemaker	1

Their residence in India was—

Under 1 year	10
„ 5 years	3
„ 10 „	2
„ 15 „	3

They were of ages—

20 to 29 years	7
30 to 39 „	9
43 years	1
55 „	1

Examination of the body after death was allowed in 14. In the 4 not examined there was—

Undoubted copious discharge of abscess through the lung in	2
Doubtful discharge of abscess through the intestine in	1
No discharge from the abscess in	1

In the 14 examined after death there was one in whom hepatitis, for which he was first treated, had ended in resolution, and who had subsequently died of pulmonary disease; and there was another in whom the hepatic symptoms had subsided, and the concurrent dysentery had ended fatally.

In the remaining 12 there were inflammatory adhesions of the peritoneal coat of the liver in 8, and no such adhesions in 4. There were recent adhesions of the neighbouring pleura in 4, and in the other 8 no such adhesions were noted.

There was hepatic abscess in 10, and the abscess during life had not discharged in 8; had discharged through the colon in 1, and into the peritoneal sac in 1.

In these 10 cases there were—

In right lobe only one abscess in	8
In right lobe two abscesses in	1
In left lobe only one abscess in	1

The pus was generally of a pale greenish yellow; in one it was of a chocolate colour.

In the remaining fatal cases of this class there was of cirrhosis 1, and 1 of hypertrophy.

There were the following complications during treatment, besides peritonitis and pleuritis, viz:—

Variola intercurrent in 1, dysentery concurrent in 2, diarrhœa concurrent in 2, phthisis pulmonalis in 2, pneumonia concurrent in 2, general dropsy consequent in 1.

Besides these 18 cases, cirrhosis was found after death in a patient who had been admitted with ascites.

There were 336 admissions for diseases of the stomach and bowels, or 99 more than in the preceding year, and there were 49 deaths, all of which appear under dysentery and diarrhœa. In none of the preceding ten years has this number of admissions been equalled, and only in the year 1854-55 has the high ratio of mortality been exceeded. The cases sent from the shipping were the worst, in so far as they were generally admitted in a stage too far advanced to allow of active treatment. So many as 42 of the fatal cases were furnished from this source; two were military pensioners, one was a soldier's widow, one a railway engineer, and one a pauper. From dysentery there were 139 admissions, and 44 deaths; and from diarrhœa 111 admissions and 5 deaths. Under diarrhœa there were doubtless many that might more appropriately have been placed under dysentery.

Among the 5 fatal cases of diarrhœa two were children, and no examination of the bodies was made after death. The other three were adults, and in one of these the lining of the colon was found studded with suppurating miliary tubercles, and he also had pulmonary phthisis. In the other two the colon was found ulcerated. These two may be grouped with the 44 fatal dysentery cases, and to these may be added another case, which, although admitted for an old fracture, was treated for and died of dysentery: these making a total of 47.

Some of the deaths under hepatic disease would probably have been put under dysentery had the classification taken place

later in the course of the treatment, when the hepatic symptoms had given place in prominence to the dysenteric.

Of the 47 who died of dysentery the residence in India was at time of admission—

Under	1	month	8	Their ages were—			
„	3	months	8	Years	19	in	2
„	6	„	10	20 to	29	„	17
„	1	year	6	30 to	39	„	19
„	5	years	7	40 to	49	„	7
„	15	„	4		58	„	2
Above	15	„	4				

There was examination of the body after death in 45 instances, and in these there were found in the colon transverse ulcers in 30

Both transverse and circular ulcers in 3

Circular ulcers in 3

Shape not specified, and chiefly ill-defined from great extent of sloughing, in 9

In one of the cases in which the ulcers in the colon were circular, there were circular ulcers in the ileum also.

There was perforation of the sigmoid flexure of the colon in one case, and of the cæcum in another, and there was peritonitis more or less extensive in 10 instances.

It was general with effusion of fluid in 1

Cæcum was glued to abdominal paries in 4

Cæcum, bladder, and rectum were glued together in 1

Sigmoid flexure, bladder, and rectum were glued in 1

Cæcum, colon, and other intestines glued in 1

Cæcum and under surface of liver glued to intestine in .. 1

Omentum, cæcum, and ascending colon glued to other intestines in 1

In one case a tubular portion of the mucous lining of the bowels was discharged during life by stool; it appeared to have been from the rectum. In one there was invagination of the transverse colon under the edge of the liver. In one there were discoid tumors, nearly cartilaginous in hardness, in the mucous

lining of the descending colon. In two there were numerous small excrescences not larger than a pea, composed of firm tufts of cauliflower structure. In one of these two cases there were ulcers, and patches of granular exudation arranged transversely to the tube of the colon; in the other there was a deep red injected state of the mucous membrane of the colon, and numerous minute streaks of ulceration, and one larger circular ulcer of about $\frac{1}{2}$ inch in diameter. The excrescences were in this case chiefly in the rectum and lower part of the descending colon. The patient latterly sank rapidly from great discharges of blood.

In the 45 cases of dysentery in which the body was examined after death, there was found hepatic abscess in 10. Of these there was abscess in both lobes in 2, in the right lobe only in 6, in the left lobe only in 2.

There was only	1	abscess	in	5 cases
„	2	abscesses	in	3 „
„	5	„	in	1 case
„	10	„	in	1 „

In no instance had the abscess discharged. The hepatic inflammation seems to have been antecedent to the dysenteric in 1 case, concurrent with it in 6, and intercurrent in 3 cases.

In the 45 cases examined the other diseased states of the liver, besides that of mere congestion, were mottled liver 1, fatty liver 1, and in one there was gangrene of the lower part of the right lobe. This patient, aged 49, had been ill with bowel complaint for 13 weeks, and had been treated for it by a medical practitioner visiting his ship, and was admitted into hospital greatly prostrated in strength and with delirium, "his hands and tongue tremulous, pulse rapid and feeble, tongue preternaturally red and glazed; calls to stool constant; strong dysenteric fœtor about his person; motions offensive, and consisting of thin feculence." The fœtor about his person is frequently noted during the four days he lived after coming to hospital. The examination of the body was made and noted by Assistant Surgeon Mead, under whose care the patient was admitted. The note of it is—"Peritoneum dusky everywhere, and arterial congestion

observed over the colon. Coats of colon slightly thickened, mucous coat presented a few transverse ulcers along the caput cæcum and ascending colon, the remainder of the intestine was free from disease beyond some congestion. *Liver.*—The lower third of the right lobe presented the appearance of an extensive slough, which easily separated from the rest of the organ; no line of demarcation was seen. The fœtor arising from the diseased state of the organ was very great. Other organs healthy." There was no pus, and no appearance of an abscess having existed was found.

In the examination after death of the phthisis cases, ulceration of the colon was found in two.

In the class including *Diseases of the Brain and Nervous System*, there were 42 fewer admissions than in the previous year, and this nearly corresponds with the decrease in entries for *Delirium Tremens*. There was not, I think, actually so great a difference between the two years in the amount of this disease, the disparity being in part attributable to the rules followed in apportioning the admissions from abuse of alcohol between the two heads *Delirium Tremens* and *Ebrietas*. There has sometimes been manifestly a tendency to follow the nosography that divides the former disease into stages, and to call cases in which the assemblage of symptoms marking its first stage have been present by the name of delirium tremens, although delirium has not shown itself, and perhaps never would do so. This is logically correct, but I prefer classing cases in which the disease becomes no further developed under *Ebrietas*, and I endeavour to reserve the term *Delirium Tremens* for those in which waking hallucinations are evinced.

A patient is brought or comes to hospital intoxicated, or after a recent debauch or long-continued hard-drinking, with irritability of stomach, thirst, a tongue red at the edges and with a short white fur, and with perhaps a little diarrhœa, or palpitation and pain in the cardiac region, or head-ache and prostration of strength, and who is evidently unfit for duty; strictly it is a case of alcoholic poisoning. In military hospitals it is often registered as dyspepsia, gastro-enteritis, cephalalgia, or cardiac

disease. *Ebrietas* is the term that has been used in this hospital by my predecessor to include such cases, as well as all others that are the more or less serious direct effects of the abuse of alcohol, such as convulsions and apoplexy; and as it seems a legitimate application of the word, I have continued its use.

If the admissions under *Delirium Tremens* and *Ebrietas* together for the last year be compared with those of the preceding year, it is seen that they are nearly equal, and that the ratio of mortality in last year is only 3·4 per cent. There were 5 deaths attributed to delirium tremens, 3 of them were in well-marked cases; these terminated in convulsions and coma, one in 54 hours after admission, another in 72 hours, and the third in 79 hours. Of the other two fatal cases one was admitted with fever, accompanied with a scarlet desquamating eruption, and while being treated for this, with saline refrigerants and antimonial medicine, he became delirious 48 hours after admission, had convulsions, and died comatose in 12 hours more. He had on a former occasion been treated for delirium tremens, and it was ascertained that he had been drinking hard up to the time of admission. As the abuse of alcohol was the chief cause of his death, his disease was registered as delirium tremens. The fifth case was that of a patient who had before suffered from delirium tremens. He was stated to have been delirious for several days, and yet to have continued to drink up to the hour of admission. Immediately after coming to hospital he had convulsions, from which he partially recovered, but they returned, and he died 18 hours after admission.

The fatal case of ebrietas was that of a female, aged 40, who after hard-drinking was admitted with irritability of stomach and diarrhœa. She had considerable enlargement of the liver. 21 hours after admission the surface became intensely hot, and quickly coma and stertor followed. She died in 3 hours more.

No examination of the body was allowed. In 2 of the well-marked fatal cases of delirium tremens, serum was found in the arachnoid and ventricles, and the vessels of the encephalon were distended with blood. The lungs were noted to be normal. In the third of these cases no examination of the body was permit-

ted. The only other case in which the body was examined, was that in which eruptive fever was present; in it there was no abnormal collection of serum in the brain, the vessels in the pia mater were turgid, but those of the choroid plexus were not so, neither did the cut surfaces of the cerebrum exhibit much vascularity. There was, however, very great sanguineous congestion of the lungs.

The treatment of *Delirium Tremens* during the year has been chiefly expectant, and in the uncomplicated cases that have been under my own immediate care, no medicine whatever has been given. The patient is secluded, and kept as quiet as the present imperfect hospital accommodation will allow, and where there is any heat of head the cold affusion is used, and sometimes along with it the hot pediluvium; in many cases, however, even these remedies are not employed. Attention is always paid to alimentation, and strong broth is given at regular intervals.

I had followed this plan for many years in the cases that from time to time came under my care, and now that I have had trial of it in a more abundant field of observation, I continue to be satisfied with it.

There are four deaths under *Rheumatism*. One of these ought to have been returned as aneurism: the patient died 3 days after admission from the bursting of a small aneurism of the ascending aorta into the pleural sac. In two of the cases there was fatal metastasis to the head, and in the fourth there was severe carditis.

From *Cholera* there were 15 admissions and 11 deaths—a very large mortality.

The fatal case of *Stricture of the Urethra* was in a seaman, who had been operated on by a medical man attached to the Persian expedition. The wound in the perinæum was not healed, and he sank a fortnight after admission. There was found to be suppurative inflammation in both kidneys.

The *Occlusio Urethræ* was in a lad in whom the healing of a sore on the glans penis had caused cohesion of the edges of the orifice. The occlusion was so great that force had to be used to introduce a common probe. He had been for some time in the habit of picking an opening with a pin or a needle, to allow

him slowly to empty his bladder. By bistoury the orifice was enlarged, and it was kept open with a bougie until healed.

The case of *Occlusio Vaginæ* which remained from the preceding year, and was discharged during the last year, was of traumatic origin. From her statement it was learnt that the catamenia commenced at the age of 14½ years, and were regular until her marriage at 15 years, and for 3 months subsequently. That at a year after marriage she gave birth at an outstation to a son, after 24 hours of labour, during which she was attended by the hospital nurse. After the birth of the child the placenta was retained, and was removed by a medical man, who was then called in. Vaginal injections had to be used, and she remained upwards of a month in hospital. Since the birth of her child, who was now (at the time of her admission) 7 years old, she had never menstruated. About two years after her confinement, she suffered from pain at monthly periods, but not during the last three or four years. She had latterly had difficulty in micturition and discomfort in her head, otherwise her health was good. Lately on a catheter being used, it was discovered that the vagina was obstructed, and to obtain relief she came to Bombay. The vagina was found to end in a blind sac about 1½ or 2 inches from its entrance, and no evident mark of a cicatrix even was visible. Above the pubis a defined tumor was felt, resembling that produced by a large placenta lying in the vagina after the birth of the child, and with an appendage at its upper part like that of the uterus fully contracted above it.

It being concluded that the larger and lower part of the tumor was owing to retained catamenia in the upper portion of the vagina, a trocar was thrust through the septum, at a point where it was thought the obliteration had taken place, although there was no mark to guide. Thick tar-like fluid flowed, but so slowly that recourse was had to the bistoury to enlarge the opening by lateral incisions. About 26 ounces were thus discharged. The cavity was washed out with tepid water, and it was found that the morbid adhesion having been between the anterior and posterior walls of the vagina, the distension from the retained fluid had made a duplicature of the posterior wall

through which the opening by trocar and bistoury had now been made, and that the wall had been cut through just below and just above the point of adhesion. Fears were entertained that evil would result from possible infiltration between the vagina and rectum; this evil, however, was not realised, but extensive sloughing of the mucous lining of the upper portion of the vagina which formed the sac took place, and was accompanied with much constitutional disturbance. The opening, which at first was large enough to admit an ordinary-sized tubular speculum, gradually contracted, as the over-distended vagina resumed its ordinary size, and it had to be again enlarged by bistoury.

The catamenia reappeared before she left hospital. She is now, at the date of this report, in good health.

During the year a child of European parents, aged $2\frac{1}{2}$ years, was brought as an out-patient with congenital *Occlusio Vulvæ*. The urine flowed by an orifice close under the preputium clitoridis. The velum was mostly membranous, but was more solid near the clitoris, probably from cohesion of the nymphæ. The velum was divided, and the parts healed in a few days, the deformity being quite removed.

A case of post partum hæmorrhage owing to *Inversion of the Uterus*, which the nurse asseverates took place spontaneously, ended fatally.

There was a death, one hour after admission, from suicidal throat-cutting in a seaman.

Of the four deaths from *Fracture*, one has been already mentioned under dysentery. In another patient there were, from blasting rock, compound comminuted fracture of forearm, and compound fracture of ribs. Amputation of the arm was performed, but the patient sank under extensive suppuration about the wound in the chest. In another, who had compound fracture of the thumb, amputation was performed after trismus had begun; he died of the tetanus. The fourth had compound fracture of the skull with depression; here also death was immediately caused by tetanus.

The case of *Compressio Cerebri* was in a seaman, whose skull was fractured by a fall on ship-board.

There were 3 admissions for *Traumatic Tetanus*; one case from a contused wound of the leg in the mate of a ship ended fatally on the 21st day of tetanus, and 7 days after admission. In the other two the disease was caused by punctured wound of the sole of the foot. One was discharged, and the other remains under treatment.

A case of *Aneurism* of the ascending and transverse aorta proved fatal from dropsical effusion and diarrhœa, without its bursting. Two died of *Erysipelas*; in one, a woman, it was idiopathic; in the other, a seaman, it arose apparently from ulcers of the scalp. An infant and a seaman died from *Cynanche*; in the former the inflammation extended to the glottis; in the latter there was sloughing, and it probably was of a syphilitic nature. The death from *Albuminaria* was in a female who had been long ill and anæmic, and who died exhausted after parturition. In the fatal case of *Rubeola*, the child had double pneumonia.

Of the 6 fatal cases of *Variola* 3 were taken ill in hospital, one being under treatment for rheumatism, another for fractured femur, and the third for compound comminuted fracture of the leg. The others were admitted with the disease; two of them were seamen, and the other a female child 20 months old. All had been vaccinated excepting the child.

Having frequently, and recently too, represented the inconveniences of the hospital, and the disadvantages under which the sick in it have to be treated, I shall only now mention as bearing on the point that during the year 6 patients in the wards were attacked with cholera, and these all died; and that 11 were infected with small-pox, of whom 4 died.

Annual Return of Sick of the European General Hospital for the year 1857-58.

Bombay, 1st April 1858.

Class of Diseases.	Diseases.	Remained.	Admitted.	Total.	Discharged.	Transferred.	Died.	Remaining.	Total.
Fevers	Febris Ephemera	..	22	22	21	..	..	1	22
	,, Intermittens Quotidiana	3	161	164	159	..	..	5	164
	,, ,, Tertiana	..	35	35	34	..	..	1	35
	,, Remittens	4	52	56	45	..	8	3	56
	Febrile Cachexia	..	2	2	2	..	..	..	2
Eruptive Fevers.	Variola	1	34	35	17	..	6	12	35
	Varicella	..	8	8	..	..	..	8	8
	Rubeola	..	5	5	3	..	1	1	5
Diseases of the Lungs.	Bronchitis Acuta	1	24	25	23	..	1	1	25
	,, Chronica	..	7	7	7	..	..	..	7
	Pneumonia	..	9	9	8	..	1	..	9
	Catarrhus Acutus	..	14	14	14	..	..	..	14
	Phthisis Pulmonalis	7	34	41	30	..	9	2	41
	Asthma	..	3	3	3	..	..	..	3
Diseases of the Liver.	Hepatitis Acuta	2	35	37	26	..	10	1	37
	,, Chronica	2	26	28	22	..	5	1	28
	Icterus	..	5	5	5	..	..	..	5
	Abscessus Hepaticus	..	3	3	1	..	2	..	3
	Hepatis Morbus	1	..	1	..	..	1	..	1
Diseases of the Stomach & Bowels.	Gastritis	..	2	2	2	..	..	..	2
	Hœmatemesis	..	1	1	1	..	..	..	1
	Dysenteria Acuta	1	87	88	53	..	29	6	88
	,, Chronica	4	52	56	39	..	15	2	56
	Dyspepsia	..	31	31	29	..	..	2	31
	Colica	..	33	33	33	..	..	..	33
	Diarrhœa	2	111	113	105	..	5	3	113
	Obstipatio	..	16	16	16	..	..	..	16
	Gastralgia	..	1	1	1	..	..	..	1
	Cholera Morbus	..	2	2	2	..	..	..	2
Epidemic	Cholera	1	15	16	5	..	11	..	16

Class of Diseases.	Diseases.	Remained.	Admitted.	Total.	Discharged.	Transferred.	Died.	Remaining.	Total.
Diseases of the Brain.	Cephalalgia	..	23	23	23	..	..	..	23
	Ictus Solis	..	5	5	5	..	..	..	5
	Apoplexia	..	1	1	..	..	1	..	1
	Paralysis	..	12	12	9	..	2	1	12
	Mania	..	3	3	3	..	..	..	3
	Delirium Tremens	3	59	62	55	..	5	2	62
	Epilepsia	1	6	7	6	..	1	..	7
	Hemicrania	1	2	3	3	..	..	..	3
	Hyebrencephaloid disease	..	1	1	..	..	1	..	1
	Vertigo	..	1	1	1	..	..	..	1
	Melancholia	..	1	1	1	..	..	..	1
Dropsies	Anasarca	..	4	4	4	..	..	..	4
	Ascites	..	1	1	..	..	1	..	1
Rheumatic Affections	Rheumatismus Acutus	1	58	59	52	.	3	4	59
	„ Chronicus	2	71	73	69	..	1	3	73
	Odontalgia	..	2	2	2	..	..	..	2
Venereal Affections and Diseases of Genital Organs.	Syphilis Primitiva	3	111	114	99	..	..	15	114
	„ Consecutiva	2	38	40	35	..	..	5	40
	Ulcus Penis non-Syph.	..	1	1	..	..	..	1	1
	Bubo Simplex	3	41	44	42	..	..	2	44
	Gonorrhœa	4	31	35	33	..	..	2	35
	Orchitis	2	19	21	21	..	..	..	21
	Strictura Urethra	..	14	14	11	..	1	2	14
	Phymosis		2	2	2	..	..	..	2
	Vaginæ Occlusio	1	..	1	1	..	..	..	1
	Urethræ „	..	1	1	1	..	..	..	1
Abscesses and Ulcers.	Phlegmon et Abscessus	2	37	29	37	..	..	2	39
	Paronychia	..	3	3	3	..	..	..	3
	Ulcus	4	41	45	41	..	..	4	45
	Fistula in Perineo	..	1	1	1	..	..	..	1
	Furunculi	..	10	10	10	..	..	..	10
	Mammæ Adenitis	..	1	1	1	..	..	..	1
	Fistula Lachrymalis	..	1	1	1	..	..	..	1
Wounds and Injuries.	Luxatio	..	2	2	1	..	..	1	2
	Subluxatio	1	16	17	17	..	..	..	17
	Vulnus Incisum	..	16	16	15	..	1	..	16
	„ Laceratum	..	6	6	6	..	..	..	6
	„ Punctur	..	1	1	1	..	..	..	1
	Contusio	3	53	56	54	..	..	2	56
	Ambustio	..	2	2	2	..	..	..	2
	Fractura	5	31	36	28	..	4	4	36

Class of Diseases.	Diseases.	Remained.	Admitted.	Total.	Discharged.	Transferred.	Died.	Remaining.	Total.
Wounds and Injuries.	Compressio Cerebri	..	1	1	..	..	1	..	1
	Morsus Equi	..	1	1	1	..	..	..	1
Diseases of the Eyes.	Ophthalmia.....	1	21	22	22	..	..	..	22
	Amaurosis	..	1	1	1	..	..	..	1
	Nyctalopia	..	1	1	1	.	..	..	1
Diseases of the Skin.	Eethyma.....	1	5	6	5	..	..	1	6
	Scabies	1	3	4	3	..	..	1	4
	Psoriasis	..	2	2	2	..	..	..	2
	Herpes.....	..	3	3	3	..	..	..	3
	Impetigo	..	2	2	1	..	..	1	2
Other Diseases.	Aneurisma	..	2	2	1	..	1	..	2
	Cynanche Tonsillaris ...	..	5	5	3	..	2	..	5
	,, Trachealis	..	1	1	..	..	..	1	1
	Dracunculus	..	11	11	11	..	..	..	11
	Epistaxis	..	1	1	1	..	..	..	1
	Erysipelas	..	6	6	4	..	2	..	6
	Hæmorrhois	..	3	3	3	..	..	..	3
	Hernia	..	5	5	5	..	.	..	5
	Hydrocele	..	7	7	7	..	..	..	7
	Necrosis	..	1	1	..	..	..	1	1
	Nephritis	..	1	1	1	..	..	..	1
	Neuralgia.....	..	7	7	7	..	..	..	7
	Otitis	..	4	4	4	..	..	..	4
	Scorbutus	..	42	42	36	..	..	6	42
	Scrofula	2	7	9	6	..	..	3	9
	Tetanus	..	3	3	1	..	1	1	3
	Tumores	1	2	3	2	..	..	1	3
	Vermes	1	8	9	7	..	..	2	9
	Albuminuria	1	3	4	3		1	..	4
	Abortio	..	2	2	2	..	..	..	2
	Condylomata	..	1	1	1	..	..	..	1
	Debilitas	..	9	9	9	..	..	..	9
	Drowning	..	2	2	1	..	..	1	2
	Ebrietas	5	111	116	113	..	1	2	116
	Elephantiasis	..	3	3	3	..	..	..	3
	Hæmorrhage (uterine) ..	..	1	1	..	..	1	..	1
	Morbus Cordis	1	6	7	7	..	..	..	7
	Laryngitis	..	2	2	2	..	..	..	2
	Metritis	..	1	1	1	..	..	..	1
	Hysteria	..	1	1	1	..	..	..	1
	Parturitio	..	4	4	4	..	..	..	4

Class of Diseases.	Diseases.	Remained.	Admitted.	Total.	Discharged.	Transferred.	Died.	Remaining.	Total.
Other Diseases.	Periostitis	..	2	2	2	..	..	..	2
	Angina Pectoris	..	1	1	1	..	..	..	1
	Eclampsia	..	1	1	1	..	.	..	1
	Ptyalismus Mercurialis	..	1	1	1	..	..	..	1
	Dentition (Gingivitis)	..	1	1	1	..	..	..	1
	Renal Calculus	1	..	1	1	..	..	..	1
	Hydatids	..	2	2	2	..	..	..	2
	Polypus Nasi	..	1	1	1	..	..	..	1
	Total	82	1870	1952	1697	..	135	120	1952

REPORTS UPON COUP-DE-SOLEIL.

Presented by the Director General, Medical Department, 1858.

Report of a Board of Medical Officers, assembled by order of Major General Sir Hugh Rose, K.C.B., Commanding Central India Field Force, dated 10th May 1858, to investigate circumstances connected with the death of several men of Her Majesty's 71st Highlanders, before Koonch, on the 7th May 1858; as well as other points referred to in a letter from the Superintending Surgeon of the Force, No. 65 of 1858, dated 8th May, to the Chief of the Staff.

President.—Surgeon Arch. Stewart, 14th Light Dragoons.

Members.—Surgeon W. Simpson, H. M.'s 71st Highlanders, Assistant Surgeon O'Brien, attached to 3rd Bombay European Regiment.

Camp, Calpee, 30th May 1858.—The Committee assembled agreeably to order; but, from being at the time in the immediate vicinity of the enemy, urgent professional duties, and other causes, it was unable regularly to prosecute its inquiries. This, it is hoped, will sufficiently explain any delay which may have occurred in furnishing this report. The points submitted for investigation will, as far as possible, be disposed of in the order in which they occur in the Superintending Surgeon's letter. In the first paragraph of that letter, a contrast is drawn between the difference of result as to fatality on the 7th May among the men of H. M.'s 71st Highlanders and those of the 3rd Bombay European Regiment, although during that day both corps were equally exposed to the same cause of disease, and under circumstances, to all appearance, precisely similar.

Similarly situated, however, as the two corps may have been on the 7th of May before Koonch, antecedent circumstances, as respects each, were somewhat different; for example, a portion

of the 3rd European Regiment took the field in July 1857, and was joined by the remainder or greater portion of the corps, at Aurungabad, about the end of October. The whole afterwards marched, and took part in different operations with the Central India Field Force, including the siege of Jhansi, about the beginning of April. Although the men of the 3rd European Regiment may, during this time, have occasionally been employed on arduous duties, they, as a body, it is believed, enjoyed good health. They were also from the same cause gradually trained to field duties during the most favourable period of the year, as well as, from previous residence in the country, more or less inured to climate. The average period of residence in India of men of the 3rd Bombay Regiment is said to be about three years. Besides, after the capture of Jhansi, they had the benefit of three weeks of comparative rest before the advance on Koonch.

Taking all these circumstances into consideration, the men of the 3rd Bombay European Regiment may fairly be presumed to have been in a comparatively favourable state for further active military operations.

The previous circumstances of the 71st Highlanders were as follows:—The regiment landed at Bombay, from Malta, *viâ* Suez, on the 6th and 8th February 1858. The right wing, alone concerned in the present investigation, proceeded immediately from Bombay to Mhow, by railway and bullock-train, where the last detachment arrived on the 17th March. On the 29th March the wing commenced its march from Mhow towards Goonah and Jhansi, arriving at the former place on the 14th April, at the latter on the 2nd May; leaving Jhansi on the same night to join the 2nd Brigade, two marches in advance. The men always had coffee either before marching, or midway if the march happened to be a long one. The wing halted at Goonah from the 15th to 20th April, both days inclusive.

From what has been above stated, it will be seen, that from their position during the voyage, as well as during the journey from Bombay to Mhow, by railway and waggon-train, the men of H. M.'s 71st Highlanders had, for some time, been compelled to lead a comparatively inactive life. Immediately after this

period of inaction, they were suddenly called upon to undertake a series of long marches, as also to continue them, at the beginning of the hot season, and under circumstances of great disadvantage, particularly to a corps just landed in the country. Between Mhow and Goonah the marches, from being doubled, were sometimes very long, as on the 6th, 7th, 12th, and 14th April.

The same took place between Goonah and Jhansi, especially on and after the 29th April; the marches performed then varying from 15 to 20 miles. The weather, particularly after leaving Goonah, became very hot; a thermometer in one of the men's tents stood, 22nd April, at 120°. The men generally marched at 1 A. M., and gained their new ground in good time. Their tents, however, unfortunately conveyed on carts between Mhow and Jhansi, often did not come up until the morning was somewhat advanced, whereby the men were sometimes exposed to the sun without any shelter. This was particularly the case between Goonah and Jhansi, when, owing to the badness of the roads, the difficulty in crossing beds of rivers and water-courses, the breaking down of carts, &c. &c., the men's tents did not sometimes arrive until noon, or even a considerable time after.

At Jhansi, however, camels were procured for the carriage of the men's tents, instead of carts. From that time the tents came up sooner, and the men consequently were not afterwards so much exposed from this cause. The tents of the 3rd European Regiment had always been carried on camels. Another cause of exposure of many of the men was the necessity of driving carts, bullocks, &c., owing to the desertion of the native drivers. This was particularly the case between Goonah and Jhansi. On the arrival of the wing at Mhow, the number of bheesties for field service appears to have been deficient. Some puckal bheesties were procured at that place to supply the deficiency, but these men soon after deserted. The men were consequently sometimes compelled to draw water for themselves, and to drive the bullocks carrying it; but, on the whole, so long as the wing marched by itself, and was enabled to pitch its camp in convenient proximity to wells, no great complaint as

to the supply of water seems to have existed, except, perhaps, in some exceptional cases. From the time, however, of joining the force, more or less distress and inconvenience from a deficient supply of water took place. This chiefly arose from the distance from the wells at which the wing happened to be pitched in carrying out the arrangements incident to a large camp, the paucity of wells, their depth, their soon running dry; the deficiency of bheesties, and the sickness of those actually employed, sometimes caused, it is believed, from over-work. Men, on some occasions, have gone upwards of a mile to procure water, and during intensely hot weather, when deaths from sun-stroke were frequent in camp.

As regards the supply of water before Koonch on the 7th May among the men of H. M.'s 71st Highlanders, it appears to have been tolerably abundant until about 11. A. M. From that hour, however, until 3 P. M., the hottest time of the day, the supply, although continued as before, was by no means sufficient. In the case of the 3rd European Regiment the supply, previously scanty, appears to have been more plentiful from 12 o'clock onwards.

Men of both corps appear to have drank water freely when it could be obtained; but in no instance does injury seem to have resulted from free indulgence in this respect. Between the hours of 11 A. M. and 3 P. M., both corps were exposed to the full influence of the sun in an open plain where no shelter was available. The strength of the wing of the 71st Highlanders in the field on the 7th May at Koonch was:—officers 15, rank and file 411; total 426. Of the 3rd European Regiment—officers 8, rank and file 311; total 319. Such is a general outline of the circumstances under which the right wing of the 71st Highlanders was placed from the time it left Malta, until the action at Koonch, on the 7th May. The men, after a period of inaction, were suddenly called upon to undertake, and to continue, a series of marches, sometimes of unusual length, in a climate to which they were unaccustomed, and, at the commencement of the hottest period of the year. This sudden transition, from a state of inactivity to one of great and continued exertion, especially in

the hot season of the year, over-taxed men's powers; and from this state and its consequences there was not sufficient time or opportunity for recovery. This was further increased by continued interruption to, and insufficient natural rest, conjoined with more or less daily exposure to the sun in waiting for tents, &c. &c. From these and other causes the men, at the time they arrived before Koonch, were in great measure worn out, their nervous and muscular powers in a state of great exhaustion, and their powers of resisting the causes of disease diminished in proportion. To these causes, it may be further observed, the men themselves distinctly attribute much of the fatality and sickness which took place at Koonch, as well as since.

It is also worthy of remark, that on all occasions the 71st Highlanders carried in their pouches sixty rounds of ball ammunition. The men of the 3rd Bombay European Regiment never carried more than forty rounds each.

Diet.—Both corps appear to have received the ordinary rations, with the modification ordered some time ago in camp, regarding increase of meat. The ration of the 7th May was issued on the afternoon of the 6th, and immediately cooked for use on the following day. The men of both regiments seem to have used a portion of their rations during the halt which took place on the morning of the 7th about daylight, or soon after, previous to the attack; and the remainder at any time they found convenient. In this respect there does not appear to have been any particular difference; neither can they be said to have gone into action under the influence of excessive repletion, or the reverse.

As regards obedience to the calls of nature, both corps seem to have been similarly placed; and each enjoyed the same opportunities, with as little restriction as the circumstances of the moment could admit.

Grog.—The first issue of grog took place about daylight, or soon after; and while the men were using a portion of their ration, cooked on the previous night. Both corps had it at the same time, and the men of each, with but few, if any exceptions, drank it off on the spot where it was issued. The second issue took

place after the enemy had fled. No extra grog, beyond the ordinary two drams allowed daily, appears to have been issued to the men of either corps on the 7th May.

Dress.—The dress of both corps, viewed generally, seems well suited for field service in the hot months. That of the 71st is admirably so, being loose, comfortable, and allowing the free, unrestrained use of every limb; and, at the same time, combining a certain regard to appearance. No stock or neckerchief was worn at Koonch on the 7th May by the men of either corps. When anything is worn round the neck, it consists either of a soft low stock, or neckerchief. The same unqualified approbation expressed as regards the general dress cannot be extended to the head-dress of either corps, although that of the 71st is by far the best of the two. It may be mentioned, that the foundation of the 71st head-dress is the ordinary regimental Highland bonnet and peak. This is enclosed in a cap-cover of thick cotton cloth of light leaden grey (?) colour, of the same material as the other parts of the dress, with a broad flap hanging down behind, to protect the back of the head and neck. Surrounding the head, moreover, outside the cap-cover, is a roll of some thickness, stuffed with cotton wool. The chief objections to this head-dress, for the hot months, seem to be a deficiency of ventilation and want of space between it and the head of the wearer, as well as the colour of the cap-cover, which favours the absorption and accumulation of heat when exposed to the sun's rays, with, perhaps, some deficiency in the extent to which the upper and fore part of the flap approaches the corner of the peak on each side. The cap-cover, moreover, instead of consisting of different portions to be secured to one another by buttons, should uniformly have all its parts firmly sewn together, so as it were to form one complete piece. When not so made, the curtain, one of the most essential parts of the cap-cover, is apt to be left behind, and not to be forthcoming when its protection is most required,—an evil, which is prevented by having the cap-cover, when worn at all, in every respect complete. The cap-cover should, moreover, be quilted with cotton wool, or, what is perhaps better in several respects, thick

flannel, well shrunk before being cut into shape. The objection to the colour of the cap-cover, on account of its liability to absorb and retain heat, might easily be obviated by the use of a white turban applied over the present cap-cover, which would not only prevent the accumulation of heat referred to on exposure to the sun, but also afford additional protection from the direct effects of solar heat. One practical proof of the advantage is that, during the intensely hot weather which prevailed during the latter part of May, many of the men of the 71st spontaneously adopted the use of the white turban over the ordinary cap-cover, and still continue to use it, entirely on account of, as they declare, the greater comfort and protection it affords. Were the use of the white turban found at any time objectionable in a military point of view on account of colour, near an an enemy, its temporary removal would be attended with no difficulty or loss of time. The head-dress of the 3rd European Regiment consists of the ordinary Kilmarnock cap, of much the same material and texture and make as the Highland bonnet of the 71st. Around this, is folded a turban of dark reddish orange (?) colour, with a portion of the turban hanging down behind, affording but a very flimsy and insufficient covering to the back of the head, or indeed to any part of the head. The Kilmarnock itself does not sufficiently cover the head, and the addenda are quite insufficient also. Nothing could be more unsatisfactory than the present head-dress of this corps, as a protection from the sun in the hot season. The adoption of something like the head-dress suggested for the 71st, with the alterations recommended as to ventilation, &c., would, in the opinion of the Committee, be very desirable, as before mentioned. It has been before remarked that the 71st carry in their pouches one-third more ball ammunition than the men of the 3rd Bombay Regiment. This, although apparently of little moment, must produce unfavorable effects upon men after a long march, especially in the hot months, when all men's energies are, as it were, already prostrate from the enervating influences of heat and climate.

Climate.—The opinion of the Committee, as adverted to in the Superintending Surgeon's letter under this head, may be inferred

from the remarks to be found in the details contained in the first paragraph of this report. In the opinion of the Committee, the following are to be considered as powerful predisposing causes to the form of apoplexy so common and so fatal under certain circumstances during the hot months of the year in the N. W. Provinces and adjoining districts; and which, either in the form of decided apoplexy, or in the modified form of different degrees of "sun-stroke," has of late been so prevalent among the troops composing the Central India Field Force.

Excessive heat, especially if conjoined with a dry state of atmosphere; direct exposure to the sun, particularly if conjoined with laborious duties, or attended by fatigue and exhaustion caused by previous exertion; insufficient sleep or natural rest, especially if for any prolonged period, or combined with inordinate labour; duties under circumstances involving undue exposure to the sun, as for example,—parades at too late an hour in the morning or at too early an hour in the afternoon. To these may be added,—crowding men in tents or barracks,—want of water and reasonable comforts,—together with excesses of any kind,—as well as any cause, mental or bodily, which tends to depress or exhaust the nervous energies of the system.

Although the simple mention of these causes seems sufficient to indicate the course by the adoption of which much sickness and mortality may frequently be obviated, it may be observed that during the hot and rainy months, especially in the N. W. Provinces or adjoining districts, all duties should be rendered as light as possible, and all undue or unnecessary exposure of troops to sun and weather during those times, as far as possible, scrupulously avoided. Crowding in tents as well as in barracks is also to be avoided; and in the latter, tatties and punkahs in the hot, and punkahs in the rainy season, are indispensable to the health and comfort of the troops.

To troops marching in the hot months an extra proportion of tentage should be allowed, the present scale of tent accommodation being calculated only for the colder months of the year.

An extra number of bheesties should be allowed while marching, or in the field, in the hot months; and the hospital tents,

if not the troop tents also, should be supplied with portable tatties, &c.

Every regiment in marching, or in the field, should have its due proportion of privy tents, as allowed by the Bengal regulations, to protect the men from sun and weather. The exposure in camp, from want of privy tents, is often great, and cannot but prove injurious.

The assembly of Committees and Courts Martial during the day, in the hot months ought, by every possible means, to be avoided, assembling instead early in the morning. On such occasions many men required to attend as witnesses, or for other reasons, during the day, are not unfrequently detained for hours, being too often, during that time, but imperfectly protected from sun and weather.

Character, &c.—The ages of the men of the 71st regiment who died of apoplexy from sun-stroke before Koonch on the 7th May varied from 22 to 32 years. They were among the most athletic men of the regiment. One is noted to have been "a free liver;" another a "tolerably free liver;" the remaining six "sober."

REPORTS ON COUP-DE-SOLEIL

IN

H. M.'s 71st REGIMENT (RIGHT WING) IN CENTRAL INDIA, 1858.

BY W. SIMPSON, M.D., Surgeon H. M.'s 71st Regt.

Presented by the Deputy Inspector General H. M.'s Hospitals.

The average strength of the wing during the months of May, June, and July 1858 was 417 non-commissioned officers, rank and file; 89 cases of sun-stroke occurred between the 5th of May and the 15th of August, of which number 26 died; 13 suddenly, either on the line of march, in the field, while engaged with the enemy, or in camp; and the remaining 13 died in Hospital. I may here state that the men composing the regiment arrived at Bombay from the Mediterranean on the 6th of February 1858, and in the latter part of the same month proceeded by bullock train to Mhow. On the 29th March left Mhow, *en route* to Jhansi, and joined the C. I. F. Force at Goonah on the 5th May, having marched the whole way from Mhow. The regiment arrived at Jhansi on the morning of the 2nd May, and there was little or no sickness till this date; the men, however, were becoming exhausted from long marches that were made during the previous four nights, and they obtained no rest in Jhansi, but proceeded to Chirgong the same night (2nd May) at 10 o'clock, a distance of 18 miles; from Chirgong to Moote, a distance of 16 miles, was performed the following night. These long marches produced much exhaustion, and, in a great measure, accounted for the numerous cases of sun-stroke that occurred at Koonch on the 7th May, and on various future occasions.

Symptoms.—The following symptoms were invariably present:—an intensely hot, dry skin, which lasted till even after death in those that died within 12 or 16 hours; a sense of constriction of the chest and laboured breathing, with a feeling of a heavy weight just below the ensiform cartilage. Great prostration of strength, accompanied very frequently with inability to answer questions without weeping (the strongest and most robust were not exempt from these symptoms); a tumultuous action of the heart, with strong pulsation of the carotids; pulse varied much, but was never full and hard; head-ache referred more particularly to the summit of the head, conjunctivæ injected, pupils acted to the stimulus of light, unless during convulsions, or during the stage of coma, when they were fixed and contracted. In several instances, however, they became suddenly dilated for a few minutes, after being fixed and contracted to a point. Countenance generally pale at the commencement, but in those cases of a severe character, or that had a fatal termination, it assumed a leaden hue; the urine was never entirely suppressed, but it passed off involuntarily drop by drop; bowels were generally costive, though several cases occurred the bowels being quite natural in every respect. There was also a great desire to sleep, so much so that if not checked at first, it passed into coma, which almost invariably terminated in death. Loud moaning during the stage of coma was also invariably present. Death either occurred from convulsions, most frequently of an epileptic character, or from coma. The symptoms, however, varied according to the severity of the attack, and the constitution or temperament of the patient. Death sometimes occurred almost instantaneously. One man just before arriving in camp at Banda, (the regiment did not arrive on the encamping ground this day, 12th May, till after noon, and the thermometer was 120° Fah. in the tents,) after a march of over 20 miles, fell down in the ranks, uttered a shriek, and expired in a few minutes. A man at Koonch, before the engagement with the rebels took place, fell asleep for a short time during a halt that occurred (the sun being fully two hours above the horizon), and on being

roused up answered questions with difficulty, and he had lost the use of his limbs. Others again were seized with maniacal symptoms: a man at Calpee made a rush at the Hospital Bheestie and tore the mussuck from him, and on remonstrating with him I remarked he was quite deranged in his mind. After getting some water to drink (which he swallowed in a painfully ravenous manner), and having a quantity poured over his head and body from a height, he became quiet, and shed tears abundantly. Others again smiled and laughed (unnaturally) at one time, and at another became excited and alarmed, if spoken to, and any attempt at deglutition brought on convulsions. In short, some of the cases presented symptoms of apoplexy, some of epilepsy, mania, and hysteria. The disease under consideration, when of a severe character, more closely resembles apoplexy or epilepsy (which often merges into apoplexy) than any other disease I am acquainted with. In many of the cases that came under my care, genuine epileptic convulsions ensued, lasting from 5 to 10 minutes, with intervals of variable duration of perfect consciousness and rest. During the stage of coma the pupils were fixed and contracted, and the conjunctivæ injected, and there was loud moaning till a few minutes previous to dissolution taking place, which last symptom, however, I have never heard in pure cases of apoplexy that have come under my observation.

Post-mortem Appearances.—Time and opportunity did not allow of *post-mortem* examinations being made to any extent on the line of march, during the late campaign, when fatal cases of sun-stroke were of common occurrence, and those that were performed elucidated little or nothing regarding the nature of the disease; the only abnormal appearances were an excess of venous blood to a greater or less extent in the brain, and congestion of the lungs and liver. This want of balance of the circulation, taken in conjunction with the symptoms during life, induces me to believe that sun-stroke is attributable to the functions of all the organs that free the blood from those matters that are injurious to the system being either entirely or partially suspended, such as the lungs, liver, kidneys, and skin. The

blood is not perfectly oxygenized in the lungs, the bowels as a rule are confined, and the healthy action of the liver is interrupted (this last statement is, I think, proved by the fact that those men who had severe attacks of sun-stroke have since suffered from derangement of the liver). The kidneys evidently do not perform properly their functions: the urine is not suppressed, but it is passed involuntarily drop by drop, and in diminished quantity. The skin is pungently hot, dry, and harsh (every man seized with sun-stroke, and who could answer questions, informed me that he had not perspired for a greater or less extent of time, sometimes not for days, previous to being attacked, and that he had enjoyed good health as long as he perspired, but that on the perspiration being checked he felt dull and listless, and unable to take much exertion without making a great effort). No doubt this state of the body is attributable to the nervous system being over-stimulated by exposure to the sun, more particularly when the thermometer ranges from 110° to 120° Fah. (which was too often the case in the tents occupied by the men during the day in May, June, and July), together with extreme exhaustion from long-continued exertion and want of rest.

Treatment.—The chief point in the treatment, in my opinion, is to rouse the nervous energy, which is most effectually accomplished by pouring cold water from a height over the head and nape of neck, and dashing the same in the face and over the chest, and this should be persevered in as long as there is any tendency to sleep or to coma; at the same time the patient should be roused up by speaking to him, and if necessary by shaking him. As soon as he can swallow, brandy or wine and ammonia should be given in liberal quantities, and frequently repeated; and calomel and croton oil administered, to act on the liver, and move the bowels. The most distressing symptoms a man labouring under this disease complains of are—a sense of suffocation—and a dead weight at the *scrobiculus cordis.* I have found that rubbing for some time turpentine over the chest and stomach affords the most effectual relief. These remedies, together with stimulant enemata and mustard cataplasms to the

legs, are more likely to prove successful than any I am aware of. The after-treatment consists of nourishment and stimulants, such as arrowroot, beef-tea, wine or brandy and ammonia, together with cold applications to the head, blisters to nape of neck, and acting on the liver and bowels. Bleeding, either locally or generally, is inadmissible, more particularly if there is exhaustion from previous exertion. No patient can be considered out of danger till the skin becomes cool and moist.

I would beg to offer a few suggestions as to the best mode of preventing so fatal a disease. When, during a campaign in the hot season, Europeans are exposed to the sun, encountering much exertion, and at the same time are deprived of sleep during the coolest hours, whilst they have to sleep, and partake of their meals, during the hottest hours (thereby retarding digestion, and producing a tendency of blood to the head), cases of sun-stroke no doubt must occur; still great improvements might be introduced as a means of prevention. The dress as presently constituted is defective in many respects: it is imperatively necessary to protect, not only the head from the rays of an Indian sun during the hot weather, but also the vertebral column and body generally; the dress as worn by the soldiers accomplishes neither of these ends. The forage-cap is not sufficiently thick, the crown of it rests on the top of the head, it affords no means of ventilation, and the cap-cover is little better than useless, as the men generally turn the loose curtain of it either inside or outside the cap, in order to (as they have often informed me) obtain more air, and enable them to feel cooler. The coat is made of a very thin material, and affords no protection either to the spine or body, and soldiers will not (generally speaking) wear flannel if they can avoid it. I would recommend that the head-dress consist of one piece, affording cover for the nape of the neck, and shade for the eyes; it should be made of strong, close basket-work, and well padded externally, and covered with the same material and color as the present dress introduced by Lord Clyde (during the hottest months of the year, and when not in presence of an enemy, a white puggry might be worn over this cap to reflect the heat); it should be of sufficient height to allow of a

vacant space between the top of the head and the crown of the cap; and, lastly, it should be furnished with means to afford ventilation. From personal experience, I am convinced this is the best sort of head-dress, but it should be made sufficiently strong to permit of it being made use of as a support for the head when the owner of it is in the recumbent position, for during the halts that take place in the night on the line of march, as well as on many other occasions, men lie down and often fall asleep, their heads being lower than their bodies (and I am inclined to think that this position of the body frequently induced head symptoms during the late campaign). If a cap of the kind I have attempted to describe is worn, an excellent pillow or support for the head is constantly at hand. I would recommend that the coat should be made of the same material and pattern as at present, but that it should consist of two layers, or have lining, with wadding between; it should be made very loose, not only at the neck, but everywhere, more particularly at the arms, and at the armpits. A coat of this description would afford a protection for the body from the sun, and it would not be felt too warm if made sufficiently loose to admit of ventilation.

From the difficulty (and frequently from the impossibility) that was experienced in the 71st Regiment during the late campaign in obtaining a sufficient supply of water for cooking purposes, and for drinking, in consequence of Bheesties deserting, and dilatory in performing their duties, I would recommend that every regiment or wing of a regiment in the field should be allowed a man (well paid) to superintend the Bheestie department, and who would be held responsible that an ample supply of water was always at hand, on the line of march, in the field while engaged with an enemy, or in camp. Quarter Masters and Officers have too much to engage their attention, and are at the same time frequently too much exhausted, to ensure a sufficient suppy of water being always at hand; and the want of this most necessary article is severely felt by the men, and too often produces fatal consequences.

No regiment or body of men should be marched during the

hot season, unless camels are attached to it in sufficient numbers to convey, not only the tents, but also the cooking utensils, that the men may get under cover, and be provided with breakfast, as early in the day as possible: if carts are used, great delay is always experienced.

MEDICAL HISTORY

OF THE

CENTRAL SCHOOLS, FROM THE 1ST JULY TO THE 31ST DECEMBER 1858, INCLUDING ANOTHER VISITATION OF MEASLES.

BY H. J. CARTER, ESQ., Surgeon.

Presented 1858.

Six years and a half having elapsed since the first period of my "Medical History of the Central Schools" was published,* viz. from the 1st July 1847 to the 1st July 1852, it seems desirable, as I have held medical charge of them ever since, that I should now continue it from the expiration of this period up to the end of the present year. This will occupy very little time and space, for the experience of the past five years and a half having proved to me that the former period was quite sufficient to make me acquainted with all the peculiarities of the Schools in the way of disease, it will not be necessary for me to repeat descriptions of them here; and therefore all that remains for me on the present occasion is, to give a summary of the principal observations contained in my "Annual Reports," as they are published in the "Annual Reports" of the Bombay Education Society.

1852 *(1st July to 31st December).*—The children having all become convalescent from the Visitation of Measles which took place during the first half of this year, the remaining half was characterised by marked immunity from disease generally; no severe case and no death occurring up to the end of the year.

* "Transactions" No. I. p. 128, New Series.

1853.—In the month of August *Catarrhal Ophthalmia* made its appearance in the Infant-School, and by the end of the year there had been 139 admissions from this and the Girls' School, which are together. *Varicella* prevailed chiefly in the months of September and August, amounting to 29 cases, viz. 20 in boys and 9 in girls. No case of *Small-pox* occurred, and only one of *Cholera asiatica*, which recovered. During the year the porriginous pustule described in my "Medical History," p. 71 *loc. cit.*, first became scarce. There were only three deaths, one of which was accidental, viz. from broken-neck, so that in fact there were only 2 deaths from disease.

1854.—*Catarrhal ophthalmia* made its first appearance in the Boys' School in the month of January. *Diarrhœa* and *dysentery* were rather prevalent this year; the former following *hooping-cough*, of which there were several cases in the Infant-School in the months of April and May, and 3 children died of the consecutive diarrhœa. Bad *remittent fever* with head-symptoms and *dysentery* respectively, prevailed in the months of July and August, when 4 died of the former, and 4 from the latter. Boils were also prevalent this year. The mortality was great, having amounted to 12.

In this year also there was an unusual degree of atmospheric disturbance and heat during the rains; the heat was excessive, and the rains copious and greatly prolonged beyond the usual period. After which followed the hurricane of the 2nd November.

1855.—This year was characterised by nothing remarkable beyond the number of admissions for *fever* exceeding for the first time that for *cutaneous affections*. *Catarrhal ophthalmia* was not so prevalent; *bronchitis* much more so than usual. There was no case of *cholera asiatica*, but 3 mild ones of *small-pox*. The mortality only amounted to 4.

During this year the fall of rain was little more than half of what it is generally.

1856.—This year the number of admissions for *cutaneous diseases* again took precedence of that for *fevers*, but only by 31. *Catarrhal ophthalmia* was exceedingly prevalent in both Schools, occurring and re-occurring in the same individual several times,

and attended each time by such congestion and profuse discharge, that it seemed surprising how such an amount of inflammation could take place even once, without leaving irreparable defects of vision; yet such was the contrary, that not a single patient was permanently injured by it. Some bad cases of *remittent fever* occurred again in the month of July; and 4 cases of *cholera asiatica* during the year, 1 of which only, died. There was no case of *small-pox*; but an isolated one of *measles* in the month of November. The mortality did not exceed 7.

From the weakly state of the younger children, and want of accommodation for them, together with the origination of communicable diseases among them which had spread from time to time with much virulence among the girls, whose duty it was, in part, to attend on them, I advised a separate building and establishment for the Infant-School, while others suggested that the climate of the Deccan for children at this early age was better than that of Bombay; so all, both male and female, below 8 years of age, were removed to Poona on the 19th of November,—a point of sufficient importance in the medical history of the Schools to make mention of it here.

1857.—The chief feature of this year was the Visitation of Measles in the months of March and April, of which a detailed account will be found in the following "Annual Report":—

"At the beginning of 1857 there were 334 children in the Schools, viz. 162 boys and 172 girls; and during the year there have been admitted 25 boys and 32 girls,—total 57; and discharged 33 boys and 43 girls,—total 76; the grand total, therefore, including admitted and discharged, is 391; while the average monthly number has been 307, viz. 139 boys and 168 girls, among which it should be remembered that there are no infant children now, as they have been removed to Poona.

"The total number of cases admitted into the Hospital during the year has been 446, viz. 262 boys and 184 girls, that is 189 less than during the year 1856, up to the month of November of which the Infant-School was still at Bombay.

"Of the 446 cases, 56 have been for slight attacks of *intermittent fever*, viz. 26 boys and 30 girls, that is 47 less than last

year; for *cutaneous affections (eczema, scabies* and *boils*) 46, viz. 35 boys and 11 girls, that is 85 less than last year; for *ophthalmia* 90, viz. 61 boys and 29 girls, that is 118 less than last year; for *diarrhœa* 8, viz. 6 boys and 2 girls, that is 19 less than last year; for *dysentery* 11, viz. 8 boys and 3 girls, that is 3 *more* than last year; while there have been 117 cases of *measles*, viz. 56 boys and 61 girls.

"Thus it will be seen that the number of admissions for *fever* has again taken precedence of that for *cutaneous affections*. There has been no case of *small-pox, cholera spasmodica*, or bad *remittent fever* during the past year. The *catarrhal ophthalmia*, to which I have had occasion to allude so often in former "Reports," and which commenced in the Girls' School among the infant children in August 1853, and did not reach the Boys' School until April 1856, died out among the girls in the month of January last, and disappeared among the boys during the occurrence of the *measles* mentioned. There has been no case of *dracunculus*.

"Twelve deaths have occurred, as will be seen by the following "Table of Mortality," all of which, with the exception of two, took place from *measles* or their consequences.

Table of Mortality in the Central Schools, for 1857.

N.B.—In the Column of Parentage, "E." stands for European, and "I. B." for Indo-Briton.

No.	Sex.	Parentage.	Age.	Date of Admission.	Disease.	Date of Death.
				1856		1857
1	M.	E.	12	20th Dec. ..	Diarrhœa (Scrofula.)	14th March.
				1857		
2	,,	,,	14	17th March..	Diarrhœa after Measles.	24th ,,
3	,,	I. B.	8	16th ,, ..	Ditto ditto	27th ,,
4	,,	E.	7	20th ,, ..	Ditto ditto	5th April.
5	,,	,,	6	30th ,, ..	Typhoid Fever after Measles.	10th ,,
6	,,	,,	8	19th ,, ..	Diarrhœa after Measles	11th ,,
7	F.	,,	8	13th April ..	Asphyxia in Measles	16th ,,
8	,,	,,	5	16th ,, ..	Ditto ditto	18th ,,
9	,,	I. B.	6	2nd ,, ..	Pneumonia after Measles	19th ,,
10	M.	E.	7	2nd ,, ..	Diarrhœa after Measles	3rd May.
11	F.	I. B.	7	14th ,, ..	Dysentery ditto	3rd ,,
12	M.	,,	9	10th May ..	Diarrhœa (Sloughing of Cæcum.)	18th June.

Per-centage of mortality on 307 or average monthly strength, 3·2.

"Of the two cases not fatal from *measles*, one was from *scrofula*, which began to develope its effects before the boy was admitted into the Schools, and continued, at short intervals, to invalid him from that period up to his death, which took place from *diarrhœa* supervening upon the healing up of enlarged and ulcerated glands of the neck, from whence there had long been a copious and continued discharge. The other case occurred in a boy who was admitted for *intermittent fever;* twelve days, however, after his admission, he complained of pain and swelling of the umbilicus, which presented the appearance of a boil, but on the tumour bursting, (four days later,) ileo-fæcal matter was discharged from a hole not larger than a crow-quill in the centre of the umbilicus. Every thing that was applied failed to cause this opening to close; uncontrollable diarrhœa accompanied it, and thirty-seven days after admission the boy died. On examining the state of the abdominal viscera, chronic adhesions of them to each other were found throughout, especially in the right iliac region, where there was a denser portion than the rest, in the centre of which the cœcum was found to have sloughed, while the continuity of the alimentary canal had been restored by the surrounding adhesions. The hole in the umbilicus communicated with this cavity, and hence the imperfectly fæcalized condition of the discharge. A striking circumstance in this case was, that the state of the intestine should not have been indicated by the evacuations.

"It will thus be seen, that if we deduct the admissions and mortality, consequent on the visitation of *measles*, from the total number of admissions and deaths respectively, we shall have had only 329 of the former and 2 of the latter, which is such a diminution in both, from the totals of admissions and deaths respectively, occurring in former years, that we cannot help coming to the conclusion that, during the past twelve-month, *measles* have, to a certain extent, only taken place of other affections. But even allowing this to be the case, the amount of disease during the past year has been smaller than at any former period; yet against this again must be set the removal of the Infant-School to Poona, which, it will be remembered, was on account

of the great sickness of these children, and therefore, formerly, this was the chief source of our admissions and mortality. So that after all, the extraordinary freedom from disease during the past year is more apparent than real, and hence the results, from the two unusual occurrences mentioned are only valuable in the mean of annual disease and deaths occurring among the children generally.

"Two patients now only remain in Hospital worth mentioning: one a weakly boy aged 9, suffering from large abscesses after chronic rheumatism; and the other a girl aged 12, suffering from granular swellings of the neck and other scrofulous affections; both children of Indo-Briton parentage.

Cases of Measles *which occurred in the Central Schools during the months of March and April* 1857.

BOYS' SCHOOL.

N. B.—The * marks the fatal cases. In the column of Parentage, "E." stands for European, and "I. B." Indo-Briton; "Date of Admission" means the first appearance of the eruption; and the blank in the last column means that there was no subsequent affection.

Parentage.	Age.	Date of Admission.	Date of Discharge.	Supervening or Subsequent Affection.	Parentage.	Age.	Date of Admission.	Date of Discharge.	Supervening or Subsequent Affection.
I. B.	8	10th Mar.	26th April.	Parotiditis.	E.	12	1st April.	4th May.	
E.	14	14th ,,	21st ,,	Bronchitis.	,,	12	,, ,,	,, ,,	Bronchitis.
I. B.*	8	16th ,,	27th Mar.	Diarrhœa.	,,*	7	2nd ,,	3rd ,,	Diarrhœa.
E.*	14	17th ,,	24th ,,	Ditto.	,,	10	,, ,,	24th April.	
,,	8	19th ,,	4th May.	Ditto.	,,	8	,, ,,	26th ,,	
,,*	8	,, ,,	11th April.	Ditto.	,,	8	,, ,	4th May.	Bronchitis.
,,*	8	,, ,,	4th May.	Ditto.	,,	9	,, ,,	,, ,,	Ulcers.
,,	7	20th ,,	5th April.	Ditto.	,,	8	3rd ,,	,, ,,	
I. B.	7	,, ,,	26th ,,	Ditto.	I. B.	9	,, ,,	,, ,,	
,,	12	23rd ,,	4th May.		E.	9	,, ,,	,, ,,	
E.	6	24th ,,	26th April.		,,	7	4th ,,	26th April.	
,,	7	,, ,,	4th May.		,,	8	5th ,,	,, ,,	
I. B.	8	28th ,,	25th April.		,,	8	6th ,,	4th May.	Bronchitis.
,,	7	,, ,,	26th ,,	Diarrhœa.	,,	9	7th ,,	,, ,,	
E.	7	29th ,,	4th May.		I. B.	8	9th ,,	,, ,,	
I. B.	10	,, ,,	,, ,,	Diarrhœa.	E.	6	,, ,,	,, ,,	
E.	8	,, ,,	,, ,,		,,	10	,, ,,	,, ,,	Œdema of Feet.
,,	6	30th ,,	,, ,,		I. B.	8	10th ,,	,, ,,	
I. B.	7	,, ,,	,, ,,		E.	10	,, ,,	,, ,,	
E.*	6	,, ,,	10th April.	Typhoid Fever.	,,	10	,, ,,	,, ,,	
,,	9	,, ,,	4th May.		,,	6	11th ,,	,, ,,	Bronchitis.
I. B.	9	,, ,,	,, ,,		I. B.	10	,, ,,	,, ,,	
E.	8	31st ,,	,, ,,	Bronchitis.	E.	11	12th ,,	,, ,,	
I. B.	9	,, ,,	,, ,,		,,	9	,, ,,	,, ,,	
,,	10	,, ,,	,, ,,		,,	9	,, ,,	,, ,,	
,,	8	,, ,,	,, ,,	Pneumonia.	,,	8	16th ,,	,, ,,	
,,	10	,, ,,	,, ,,		I. B.	12	,, ,,	,, ,,	
E.	8	1st April.	26th April.	Dysentery.	E.	8	18th ,,	,, ,,	

GIRLS' SCHOOL.

Parentage.	Age.	Date of Admission.	Date of Discharge.	Supervening or Subsequent Affection.	Parentage.	Age.	Date of Admission.	Date of Discharge.	Supervening or Subsequent Affection.
E.	8	21st Mar.	4th May.		E.	7	14th April	4th May.	Bronchitis and Diarrhœa.
I. B.	8	30th ,,	,, ,,		I. B.	11	,, ,,	,, ,,	
E.	8	31st ,,	,, ,,		E.	5	,, ,,	,, ,,	
,,	10	2nd April.	28th April.		I. B.	11	,, ,,	,, ,,	Bronchitis.
,,	9	,, ,,	4th May.		E.	12	,, ,,	,, ,,	
,,	6	,, ,,	,, ,,		I. B.*	7	,, ,,	3rd ,,	Dysentery.
,,	10	,, ,,	,, ,,		E.	5	15th ,,	4th ,,	
I. B.	11	,, ,,	,, ,,		,,	7	,, ,,	,, ,,	
E.	9	,, ,,	,, ,,		,,	11	,, ,,	27th April.	
I. B.	8	,, ,,	,, ,,		,,	13	,, ,,	4th May.	
I. B.	6	,, ,,	,, ,,		I. B.	12	,, ,,	,, ,,	
,,*	6	,, ,,	19th April.	Pneumonia.	E.	7	,, ,,	,, ,,	
,,	6	,, ,,	4th May.		,,	8	,, ,,	,, ,,	
,,*	7	3rd ,,	,, ,,		,,	7	,, ,,	,, ,,	
,,	9	,, ,,	28th April.		,,*	5	16th ,,	18th April.	Asphyxia.
,,	12	,, ,,	,, ,,		I. B.	9	17th ,,	4th May.	
,,	7	5th ,,	4th May.		,,	9	,, ,,	28th April.	
E.	7	,, ,,	,, ,,		E.	12	,, ,,	4th May.	
I. B.	8	,, ,,	,, ,,		,,	8	18th ,,	,, ,,	
,,	8	6th ,,	28th April.		I. B.	12	19th ,,	,, ,,	
E.	10	9th ,,	4th May.		,,	12	,, ,,	28th April.	
I. B.	12	,, ,,	,, ,,	Pneumonia.	E.	9	20th ,,	4th May.	
E.	10	11th ,,	,, ,,		I. B.	12	,, ,,	,, ,,	
,,	7	,, ,,	28th April.	Bronchitis.	,,	11	23rd ,,	,, ,,	
I. B.	12	,, ,,	14th ,,		E.	11	,, ,,	,, ,,	
E.	10	13th ,,	4th May.		I. B.	9	,, ,,	,, ,,	
,,	12	,, ,,	,, ,,		,,	8	24th ,,	,, ,,	
,,*	8	,, ,,	16th April.	Asphyxia.	E.	16	,, ,,	,, ,,	
I. B.	6	,, ,,	4th May.		,,	12	,, ,,	,, ,,	
E.	8	,, ,,	,, ,,		,,	12	28th ,,	,, ,,	
,,	12	14th ,,	,, ,,						

"Besides the above, two other cases of *measles* occurred in the Hospital, viz. in the Matron's daughters, aged 12 and 17 respectively; both of whom had had *measles* before in England. These are the only instances, to my knowledge, of the second occurrence of this disease in the same individual during this visitation.

"This time the *measles* were much more severe than in 1852, when there were only 107 cases, with the Infant-School present;* the first admission took place on the 10th March, and the last on the 28th of April, thus extending over a period of 49 days. The last visitation commenced on the 13th March, and lasted

* In a note from the Matron of the Infant-School, dated Poona, 12th April 1857, she states that the *measles* commenced there on the 13th March, and that up to the date of her letter, 31 children had been attacked, viz. 21 boys and 10 girls; 7 of whom had died, viz. 4 boys and 3 girls. At this time there were 34 children in the School, viz. 22 boys and 12 girls.

for 74 days; this time it began and ended earliest in the Boys' School.

"Two children (see "Table of Mortality") died in the congestive stage, one two, and the other six days after the appearance of the eruption, each from *asphyxia* brought on by engorgement of the mucous membrane of the larynx and air-passages; and the rest after the disappearance of the eruption. Out of the 117 cases, 10 have been fatal, which is about 8·5 *per cent.*; at the last visitation the mortality was about 5·6 *per cent.* These cases have occurred out of a mean strength of 325 children for the months of March and April, which is at the rate of 36 cases of *measles per cent.*

"*Sequelæ.*—As at the last visitation so at this—affections of the lungs and alimentary canal with the mucous or conjunctival membrane of the eyes were the principal consequences of the *measles*, and these were subsequently followed by great prevalence of boils.

"This time the affections of the alimentary canal gave most trouble. By far the greater portion of subsequent affections were cases of diarrhœa, and out of the 10 fatal cases 5 died of it. Tormina, tympanitis and incessant evacuations, attended by urgent thirst, and in some cases vomiting, which lasted several days, at last wore the patients down to death. The discharges, though watery and very light coloured, were not white. Everything both inwardly and outwardly that was applied failed to arrest the affection, and alkaline (potash) drinks alone seemed to lessen the thirst. I examined one of the worst of these cases after death (No. 4, Table of Mortality), and literally could detect nothing to account for it; the mucous membrane of the stomach and intestines throughout did not appreciably differ from its natural state. The only other case thus examined was the one of *dysentery* (No. 11), in which there was ulceration of the mucous membrance of the colon throughout.

"The prevalence of boils took place after the children who had been attacked with *measles* had been removed to a small house on a hill close to the sea-side, and was confined to them alone. This was in the month of June, and I am disposed to

attribute their prevalence not so much to the season of the year or to the previous existence of *measles*, as to infection induced by these two circumstances, and propagated by the breath through the crowded state in which the children were of necessity compelled to live. The Hospital Matron, who was constantly in attendance on the boys, suffered equally with the boys from the same affection; and the Matron of the Girls' School, who was sent out a fortnight after the children, and who had not boils before nor had them after her return, got boils, and the *catarrhal ophthalmia* (from which many of the children were suffering) also, within a week after her arrival among them.

"Here also I would observe that, subsequent to this period, the Hospital Matron and the Master of the Schools, who had equally suffered from successive eruptions of boils in different parts of the body, had each hepatic affections, which distinctly alternated with these eruptions. The Master was sent to England in the month of August on the third alternation of the hepatic symptoms, when it was doubtful from his state whether an abscess had not already formed in the liver,* and the Hospital Matron burst an abscess of the liver into the stomach in the month of September, after the discharging of which for some days, the boils again returned, which at last subsided, and she recovered. I might here add that I had another case of this kind a few years since, which occurred at the same time of the year; the patient, a young man, had had a succession of large boils in the axilla, and was so reduced that he was advised to go to England; he went *viâ* the Red Sea, and there died of abscess of the liver.

"The children of the Infant-School, which has now been at Poona for more than a year, were also attacked with *measles* in the months of March and April, but otherwise their general health and appearance (according to Dr. Larkins' report) is so much improved, that the object for which they were removed seems to be fully realised."

1858.—During this year the average monthly number of children in the Schools has been 273, and the total number of

* I have since learnt that he arrived in England recovered.

cases admitted into the Hospital 487, viz. 211 boys and 276 girls, —that is, 41 more than last year.

Of these, 297 were for *cutaneous affections*, (*eczema*, *scabies*, *porrigo*, and *boils*,) 115 in boys and 182 in girls,—that is, 251 more than last year; for *ophthalmia* 60, viz. 17 in boys and 43 in girls,—that is, 30 less than last year; for *fevers*, chiefly intermittent, 45, viz. 21 in boys and 24 in girls,—that is, 11 less than last year; for *diarrhœa* and *dysentery* 21, viz. 15 in boys and 6 in girls,—that is, 2 more than last year; for *varicella* 14 cases, viz. 8 in boys and 6 in girls.

There was no case of *small-pox* nor of *cholera asiatica*, and only 6 dangerous cases during the year.

Only one fatal case occurred, and this took place in a boy of European parentage, aged 10 years, who was sent down from the Infant-School at Poona in a hopeless state, on the 23rd of April, and died of *bronchitis* on the 28th of May 1858; so that it may be fairly stated that, out of the children of the Central Schools, not a single death took place during 1858.

With such a healthy year, I have, of course, very few observations to make, and these refer merely to the comparative immunity not only from dangerous diseases, but from disease generally that occurred during this year. It will have been seen from the above, that the cutaneous affections were exceedingly numerous, and when it is added that they were also very severe and prolonged, it will at once be reasonably concluded that they preserved the children from more dangerous complaints. For the last eleven years that I have had medical charge of the Schools, the cutaneous affections have never prevailed so much beyond all other diseases as during 1858, which although not alone, may, in combination with an unusually healthy year generally, account for the total absence of mortality; for, as before stated, the boy who died was sent down from the Poona School, and, therefore, did not really belong to the Central Schools.

These cutaneous affections consisted of forms so very much like *scabies*, that at first sight they were frequently set down for such; and had they not been observed to pass into several other forms successively and frequently in the same individual, there would

have been no means of determining otherwise. Thus the vesicular form was followed by large, flat, watery blebs, and pustules of a porriginous aspect, equally congregated about the hands and feet; after which they left these parts, and became isolated and scattered all over the body; then passed into a mild ecthymatous form, and not unfrequently from this into ulcers; while, on the cessation of all, a severe conjunctival inflammation with muco-purulent discharge occasionally supervened. The latter was most marked at the termination of the "Rains," when the cutaneous affections which had commenced with the moist atmosphere of Spring, and had become intense during this period, suddenly dried up, and were followed by the prevalence of catarrhal ophthalmia in the same patients, both boys and girls, who had chiefly been the subjects of the cutaneous affections.

In my "Medical History" of the Schools, *loc. cit.* I have, as far back as 1852, alluded to the different phases under which the cutaneous affection abovementioned makes its appearance, and have noticed its great prevalence in the Schools just after the visitation of measles in 1847. In 1853 I noticed that it had become "scarce," and the very next year, that is in 1854, catarrhal ophthalmia broke out, and prevailed in an extreme degree until 1857, when it also disappeared with the visitation of measles of that year; and this year, as in 1847, just after the visitation of measles of that year, we had again the cutaneous affection prevailing, showing its alternation with ophthalmia in the mass as well as in the individual,—in one year and throughout several.

Although, therefore, it appears evident that a discharge from one part or the other kept the children from more dangerous disease, yet there can be no doubt of the ophthalmia having spread greatly by contagion; while, on the other hand, I cannot help thinking that, although the cutaneous affection prevailed equally in both Schools, and we had not such opportunities of seeing its communicability as that of the ophthalmia, yet that this was also contagious; under this impression, therefore, I examined microscopically the lymph and matter of both the blebs

and pustules which passed successively into each other, to see if I could detect any parasite in them; but although there were frequently fungus-cells in the latter, which were much larger than the pus-cell, and quite different from epithelial cells, yet as they could never be detected in the lymph which passed into the pus, I could not consider them in any other light than as following the decomposition of the contents of the pustule after the pus-cells had been developed; and when we come to consider that the muco-purulent discharge of the ophthalmia was undoubtedly contagious, and that it would be useless to hunt for fungus-cells there, it does not seem at all probable that the presence of the cells which I have mentioned had anything whatever to do with the origin or spread of the cutaneous affection in which they were thus found. I never saw any mycelium.

Lastly, I would observe that the children were unusually free from boils during 1858, and that although the pain, inflammation, and swelling attending the cutaneous affection above described was exceedingly great in some cases, yet it was only here and there that it assumed a furuncular character.

The following are continuations of the "Tables" of admissions &c. respectively for *Small-pox*, *Cholera asiatica*, the diseases most prevalent in the Schools, and the amount of mortality, in the first period of my "Medical History" of the Schools.

Table of Cases of Small-pox which have occurred in the Central Schools, continued from 1*st July* 1852 *to* 31*st December* 1858.

No.	Year.	Sex.	Parentage.	Age.	Date of Admission.	Date of Discharge.	Mark of Vaccination.	Remarks.
	2nd half of 1852	..	..	..	....	....	....	
	1853	..	..	..	....	....	....	
	1854	..	..	..	....	....	....	
1	1855	Boy.	E.	12	15th Jan.	4th Mar.	No mark....	Was vaccinated on the 28th Feb. 1857. Failed.
2	,,	Girl.	,,	13	28th ,,	4th ,,	Strong mark .	
3	,,	,,	,,	14	17th Feb.	5th ,,	Ditto ..	
	1856	..	..	..	....	....	....	
	1857	..	..	..	....	....	....	
	1858	..	..	..	....	....	....	

Thus there have only been three cases of *Small-pox* in the Schools during the last 6½ years, and none of these fatal. How far this may be attributed to the keeping of the "Register" mentioned in the first period of my Medical History of the Schools, *loc. cit.* p. 142, I will not pretend to say.

Table of Cases of Cholera which have occurred in the Central Schools, continued from 1st *July* 1852 *to* 31st *December* 1858.

No.	Year.	Sex	Parentage.	Age.	Date of Admission.	Date of Discharge or Death.	Remarks.
	2nd half of 1852	..	..	..	....	....	None.
1	1853	Boy.	E.	9	16th June.	22nd June.	Recovered.
2	1854	,,	I. B.	12	10th ,,	26th ,,	Ditto.
	1855	..	..	..	....	....	None.
3	1856	Boy.	E.	5	29th Mar.	9th April.	Recovered.
4	,,	Girl.	I. B.	7	20th July.	20th July..	Died.
5	,,	,,	E.	13	26th Dec.	3d Jan. 1857	Recovered.
6	,,	,,	,,	10	31st ,,	,, ,,	Ditto.
	1857	..	..	..	....	....	None.
	1858	..	..	..	....	....	Ditto.

Table of Admissions from Diseases which have been most prevalent in the Central Schools, continued from the 1st *July* 1852 *to* 31st *December* 1858, *including those of Otorrhœa, Variola, Rheumatism, Cholera, Epilepsy, and Dracunculus, &c.*

Name of Disease.	2nd half of 1852.	1853.	1854.	1855.	1856.	1857.	1858.	Total.
Cutaneous Affections (including Boils)	116	157	183	100	131	46	254	987
Fevers of all kinds	36	103	93	147	103	59	48	589
Diarrhœa	37	33	85	39	27	8	13	242
Thoracic Affections	12	41	53	71	41	31	15	264
Ophthalmia	32	215	195	69	208	90	60	869
Cynanche Parotidea	..	2	5	13	1	3	1	25
Rubeola	..	..	..	..	1	117	..	118
Dysentery	9	19	18	15	8	11	6	86
Otorrhœa	5	5	2	14	7	4	1	38
Variola	..	..	..	3	..	..	..	3
Rheumatism	2	3	1	..	3	3	5	17
Cholera Asiatica	..	1	1	..	4	..	..	6
Epilepsy	..	1	..	..	..	..	..	1
Dracunculus	..	2	..	..	3	1	3	9
Varicella	..	28	..	8	12	2	14	64
Hepatitis	..	..	..	..	3	..	..	3

Table of Mortality in the Central Schools, continued from the 1st July 1852 to the 31st December 1858.

Year.	2nd half of 1852.	1853.	1854.	1855.	1856.	1857.	1858.	Total.
Average monthly strength.	281	305	303	316	334	307	273	
Ambustio	....	..	..	..	..	..	..	..
Atrophia	....	..	..	..	..	..	..	..
Cachexia	....	..	..	..	..	..	..	..
Cholera	....	..	..	..	1	..	..	1
Diarrhœa	....	..	1	3	..	2	..	6
Dropsy	....	..	..	..	..	..	..	..
Dysentery	....	1	4	1	..	..	1	7
Debility	....	..	..	..	..	..	..	..
Fever, intermittent	...	..	..	..	1	..	..	1
Fever, remittent	....	..	4	..	1	..	..	5
Gastro-entiritis	....	..	..	..	..	..	..	..
Hepatitis	....	..	..	..	2	..	..	2
Renitis	....	..	..	..	1	..	..	1
Hydrocephalus	....	..	..	..	..	..	..	..
Marasmus	....	1	..	..	..	..	..	1
Ophthalmia	....	..	..	..	..	..	..	..
Pertussis	....	..	3	..	..	..	..	3
Phthisis pulmonalis	....	..	..	..	1	..	..	1
Rubeola	....	..	..	..	..	10	..	10
Variola	....	..	..	..	..	..	..	..
Broken-neck	....	1	..	..	..	..	..	1
Total	....	3	12	4	7	12	1	39

This Table shows a total of 39 deaths for the last six and a half years; and if we take the total of the five and a half preceding, viz. 48, which also includes a "Visitation of Measles," we shall observe that the mortality during the last six and a half years is less by 10 than that of the previous *five* and a half; while by reference to the Tables generally, the amount of admissions and disease will be seen to have undergone a still greater diminution for the same period.

During the last twelve years, the average monthly number of children in the Schools has been 312·3, and the total number of deaths for the same period 86, which gives about 2·75 deaths per cent. per annum*; while the ages have been for the most part from four to sixteen, so that the mortality is more than

* In a similar calculation, given in the "Report of the Central Schools for 1857," the result is erroneous.

twice that which it is in England; but then we have to set against this, climate and the unfavourable circumstances for health and strength under which most of these children are begotten, born, and brought up during their infancy.

Postscript.

As there are some errors in the per-centage of deaths to numbers attacked by *Measles* in my "Medical History," p. 141, I take this opportunity of correcting them, by inserting the following numerical table of the four last visitations of this disease :—

Table.

Visitations.		Number of Cases.	Mortality.	Per-centage of Deaths.
1838–39	December to April	91	5	5·4
1846–47	Ditto	144	5	4·3
1852	March to May	107	6	5·6
1857	March and April	117	10	8·5

Per-centage of deaths to total number attacked 5·6.

ANNUAL REPORT OF THE 23RD REGT. N. L. I.

For the Year ending 31*st March* 1858.

BY J. R. MILLER, M.D., Surgeon.

Presented by the Director General, Medical Department.

At the time of sending in the last Annual Report the regiment was encamped at Mohummera, where it had arrived a few days before. It formed part of the force composing the 2nd Division under Major General Outram, G.C.B., serving in Persia; and on the 26th March 1857, the successful storming and capture of the Forts of Mohummera placed us in occupation of the plain immediately adjoining.

This ground was objectionable, owing to situation, drainage, and quality of soil, rendered all the more apparent by the rainy and unsettled state of the weather which prevailed during the months subsequent to our arrival. The position of the camp was on a spot of land nearly perfectly flat, surrounded on three sides by the river, the banks of which for upwards of half a mile in breadth were densely covered with the date palm. To irrigate these, numerous creeks or cuttings were made from the river, the water of which rose and fell with the tide twice in the 24 hours. Beds of wet slimy mud, with a rank and luxuriant undergrowth of vegetation, were thus daily exposed to the action of a tropical sun, and a better nidus for the production of marsh miasmata could hardly be found any where. We were encamped about two-thirds of a mile from this hill of trees, the soil being a soft alluvial clay abounding in saline earths. Owing to this latter circumstance, the ground was never thoroughly dry; and when rain fell, which it did on several occasions, the surface soon became covered with water, which remained until removed solely by evaporation,—the stiff consistence of the soil on the one hand

hardly admitting of percolation, and the flatness of the plain on the other affording no means for its escape.

The health of the regiment, previously debilitated by the nature of the diet on board-ship, suffered in consequence; and the diseases which were produced, or became aggravated thereby, will be more particularly noticed further on.

We remained thus till near the end of May, when we were removed to Bushire. Indeed, the whole of the troops forming the 2nd Division had already left, and the 23rd Regiment was merely detained to cover the embarkation of baggage animals and stores. The evacuation of the place was rendered nearly imperative, as the season for the river overflowing its banks was rapidly approaching, and our encamping ground would speedily have been under water.

The change to Bushire was acceptable also for other reasons. The weather at Mohummera had latterly become oppressively hot, and the nights were sultry. Dysentery and diarrhœa prevailed to a considerable extent, and fever would doubtless soon have been added. The climate at Bushire was more disagreeable than unhealthy. The slightest breeze could scarcely arise without darkening the air with dust, and the heat was certainly great. The minimum for the two months we were there was 71°, and the maximum 110°. However, dysentery very speedily disappeared, fever, and especially diarrhœa, taking its place. The latter complaint assumed something of an epidemic character. It was attributed rather unjustly to the quality of the water, which was everywhere more or less brackish. This certainly for a few days produced looseness of the bowels, accompanied in some instances with griping, but the effects were for the most part transient. But the diarrhœa of which I am speaking was protracted, and not much under control, and seemed to depend upon an increased flow of bile, the liver being apparently stimulated to an unusual degree of activity. That there was certainly a remarkable tendency to deranged action of the biliary organs, was evident from the frequent appearance during the progress of other diseases of nausea, bilious vomiting, yellow conjunctivæ, and sallowness of the surface.

In the beginning of August the regiment was ordered to the island of Karrack, lying from Bushire some 30 miles in a North Westerly direction. The advantages of this change were very great, and they speedily began to show themselves in the improved health of the regiment. As the weather became cooler, fever, diarrhœa, and indeed all acute diseases, gradually disappeared. Ulcers began to assume the chief place: at first they were indolent and irritable; then foul, sloughing, and inclined to spread; and afterwards showing a tendency to gangrene. But on the rain beginning to fall, about the end of November, improvement soon became apparent.

Early in December 1857, the left wing left Karrack for Rajcote, from which date therefore my remarks as regards that part of the regiment are necessarily incomplete. The Head Quarter wing, with which I continued, maintained possession of Karrack until the 4th February 1858, when we embarked for Bombay, arriving on the 27th of the same month.

With this limitation therefore, *i. e.* having but the Head Quarter wing to notice since the 9th December last, I proceed to a more detailed statement of the sickness and mortality of the regiment as it has come under my observation for the past year. At the time of sending in the previous Report there were 13 men remaining in hospital, these, with the addition of 727 new cases, give a total of 740 treated, equal in amount to that of the preceding year when the whole regiment was together. Of this number 711 were discharged, 12 died, and 17 remain. The deaths were 2 by dysentery, 2 from diarrhœa, 2 from intermittent fever, 1 a case of delirium tremens occurring in a Mahratta; another died from phthisis pulmonalis; another was under treatment for chronic rheumatism; and suddenly during the night the next casualty occurred in a Portuguese of dissipated habits, admitted with colic—he had suffered for some time from ulceration of the small intestines. The remaining 2 deaths followed; in the one instance a large ulcer situated in the groin taking on gangrene; and in the other, inflammation of the knee-joint, complicated with phlegmonous erysipelas, and terminating in colliquative diarrhœa.

The chief bulk of admissions generally in a regiment is from *fever*, but for the past year diseases of the stomach and bowels have been of equal number, and the two together amount to three-fifths of the whole treated. The fever has been, with but very few exceptions, all of the intermittent kind, the type on admission almost entirely quotidian, though under treatment assuming frequently the tertian, and occasionally the quartan. Sometimes an intermittent has shewn a double quotidian paroxysm, and from that glided into remittent fever. The disease has on the whole been tractable, at least if I except the months we were stationed at Bushire. It was then complicated with more or less derangement of the hepatic system, as observed in the constant nausea, sallow surface, and bilious diarrhœa which accompanied it. It was during this period that I found quinine not so certainly curative in intermittent fever as experience has proved it to be; and this was observed equally in those cases in which there were neither biliary derangement nor other complications present. In these cases I found a combination of arsenic and quinine more efficacious than either of them singly. I do not know that I have departed much from the ordinary method of treating intermittent fever, and which I have frequently indicated in former reports. Experience has, I think, taught me that quinine, either alone or with arsenic, is the only remedy in which any reliance can be placed for the cure of fevers of malarious origin, complications as they arise being treated on general principles. In very mild cases I have frequently made trial of sulphate of zinc in an infusion of creat, but I am inclined to believe that in cases of this kind the fever seems to expend itself in one or two paroxysms, and that shelter from the sun, rest, and a mild aperient are perhaps all the treatment necessary. With regard to the dose of quinine, I am in favour of one or two large doses, timed so as to get the system fully under its influence by the hour the paroxysm may be looked for, rather than by a succession of small doses throughout the whole period of the intermission. I think this plan is followed by a more speedy resolution of the disease, and is attended by a considerable

saving in the expenditure of the drug, a matter in itself of no small importance.

Diseases of the Lungs are next in order to be noticed; but a few words will suffice here. The number consisted of but 14 in all, 8 of these being bronchitis. There was one case of phthisis pulmonalis, and it proved fatal. The patient was of an asthenic constitution, and had suffered previously from chronic bronchitis. There was not much disorganization of the lungs, but debility was great from the commencement, and the circumstances in which he was latterly placed on board-ship were most unfavorable to his gaining strength.

For the amount treated during the year, we have had an unusual number of *diseases affecting the stomach and bowels*, being almost one-third of the total sick; and from this class two diseases, dysentery and diarrhœa, comprised almost exclusively the whole of the admissions. The force of which we formed a part was not similarly affected, or at least anything like to the same extent. But the explanation in the case of the 23rd regiment is not difficult. We were a month in getting to Bushire, then after 10 days on shore there, the men were re-embarked for Mohummera, and spent another fortnight on board-ship. During six weeks, therefore, the non-cooking portion of the regiment were living on parched gram and powah. These men not only fell off in physical condition, but suffered more or less from diarrhœa. Shortly after our arrival at Mohummera there was heavy rain, and while the ground was everywhere wet we were ordered to change our camp. This was carried out in spite of a remonstrance on my part that sickness would almost certainly follow such a step if adopted before the ground was dry; and as if one move had not been sufficient to invite such consequences, a second was executed in not many days afterwards under very similar circumstances. It may perhaps be thought that as a medical officer I am overstepping my own province to criticize measures, the necessity of which I cannot be supposed competent to decide upon; and certainly had we at the time of which I speak been actually engaged in warfare, I should no doubt be chargeable with

presumption or folly in alluding to the circumstance at all, beyond, perhaps, deploring the sickness which followed as one of the evils inseparable from war. But we happened at this time to be at peace with Persia, and our change of position was, as I afterwards learnt, required chiefly to fill up a gap in the line caused by the removal of another regiment. However, be this as it may, our sick list swelled rapidly; diarrhœa first, and afterwards dysentery, soon filled the hospital tents. Fever likewise was greatly increased. April and May shewed the greatest number of bowel complaints, amounting respectively to 86 and 89, June gave 53, and July but 17; after which they still further decreased down to 6 and even less.

The character of these maladies was not severe. In only the minority of the cases of dysentery did the inflammation proceed to ulceration. The mortality also was extremely small, not more than 2 casualties out of 99 cases having occurred. The treatment varied of course according to the sthenic or asthenic condition of the patient, the amount of inflammation, state of the mucous membrane, pain, tenesmus, and other circumstances; but the medicine of all others which seemed to fulfil most of the indications present in the majority of the cases was ipecacuanha in small and repeated doses. This, combined sometimes with opium, and aided now and then by small leechings, fomentations, and gentle aperients, was attended with very satisfactory results. The diarrhœa was not infrequently the precursor of dysentery; but more generally it was simple or attended with slight griping, tenesmus, or perhaps a little mucus. As in the former disease, mercury, in any form, was rarely given. The compound powder of chalk and opium, with occasionally a grain or two of ipecacuanha, rest, and an unirritating diet, were nearly all that was needed. It is a circumstance worthy of remark, that not more than 2 individuals out of all the admissions under the head of dysentery and diarrhœa occurring in the regiment during the six weeks after landing at Mohummera were found amongst those who regularly partook of cooked food while on board-ship.

Upon a very important class of maladies, *affections of the*

brain, I have but little to record. However much natives of this country suffer in comparison to Europeans as regards their intellectual endowments and perceptions, they are so far gainers in being considerably less disposed to become the subjects of disease implicating that delicate and highly-organized structure, the brain and its appendages, the functions and physiology of which are so little understood, but which are seen to be more or less susceptible of derangement as we advance or descend in the scale of civilization. Four admissions are noted under the head of epilepsy, but in each instance it was the same individual who was affected. The cause of the disease was obscure. I treated him with strychnia, argenti nitras, and subsequently with zinci sulphas, in gradually increasing doses up to 3i. three times in the day without producing nausea. The symptoms, however, did not yield, and the intervals between the attacks became shorter, and the paroxysms more protracted. The patient has been recommended for pension. Much of a similar statement requires to be made concerning the 2 cases of paralysis. It was the same person twice admitted. The case was one of hemiplegia, the functions of the sensorium being unaffected. The treatment pursued in this case consisted of purgatives, the warm bath, frictions with various stimulating applications, dry-cupping, blisters, strychnine, also large doses of sulphate of zinc. Of this latter medicine a scruple thrice in the day was the limit short of nausea.

We have suffered from more than our ordinary allowance of *rheumatic cases*. The causes, at least those of cold and wet, which gave rise to the increased admissions of fever and bowel complaints were not without their influence in determining both the numbers and severity of this class of diseases. There have been 46 cases in all. Most of these were muscular, and not infrequently complicated with scorbutus. Others were fibrous, and seemed as often to have a syphilitic combination. In the one class, colchicum, diaphoretics, tonics, and a special diet and regimen were indicated; while in the other mercury, iodide of potassium, and iodine were the remedies productive of the most general benefit.

There has scarcely a case of *Syphilis* come under my notice during the past year. The comparative absence of this class of affections in the hospitals of native troops when compared with those of Europeans is owing to various circumstances, amongst which may be mentioned the more general adoption of marriage amongst the natives, their great aversion to making known a disease of this nature if affected with it, and, perhaps, their smaller degree of susceptibility to venereal complaints (?) But the isolation on board-ship, as well as the circumstance of the men being on service in an enemy's country, must not be overlooked in accounting for the great immunity from this malady enjoyed by the regiment.

Phlegmon and abscess have been numerous, but as they were all of a mild character, they demand no special mention. Of ulcers we had 17 cases, and these were nearly all serious. Until the arrival of the regiment at Karrack in August, this disease scarcely existed, or if a case or two did occur, the most ordinary applications sufficed. But at the time of which I now speak it was very different; and it mattered little what course of treatment was pursued, nearly all proved equally inefficacious. It would be tedious to enumerate the various plans which were adopted. I think there were but few of any promise that I did not have recourse to, including those which, on former occasions, I had found of service in my own practice, and likewise the different methods most in favor with others. Of the whole range I am satisfied that those of a stimulating kind agree best, also diet and regimen with the use of ale or porter form a very essential part of the treatment, and appear to me to be of more service than a general routine of tonics, alteratives, and medicines of this class, though of course, in certain cases, these last are not to be forgotten. But I would give the preference decidedly to simple change of air as being above and beyond them all in point of efficacy; and indeed at certain seasons of the year in the country of which we were then having experience, the cure of some of these ulcer cases was perfectly hopeless unless this latter plan was resorted to.

It was during the months of September, October, and Novem-

ber that the ulcers were so extremely unmanageable, being irritable, foul, and glassy, with no disposition to heal; on the contrary, spreading sometimes very rapidly, with intolerable stench, and latterly showing a tendency to gangrene. One fatal case is recorded under this head, and it occurred in a man who had had an open bubo in the groin, which he had concealed for some months. On his coming into hospital the sore looked healthy enough, but the probe detected several very deep sinuses running down apparently behind the deep fascia of the pelvis. These could not be induced to close, neither would the sore heal; and although he was entirely separated from the other patients, he was attacked by gangrene, which was then prevalent, and sank rapidly. Another case of extensive phagedenic ulcer on the leg was hastening to a fatal issue, when I amputated the limb below the knee. The stump for a while progressed favorably, but before long the dressings turned black, accompanied with a sanious fœtid discharge, and then the edges of the wound began to blacken and gape; the pulse also was frequent and feeble. I was much afraid these symptoms would assume a more serious aspect, and, as a last resource, necessitate another operation, and it was with no small satisfaction I witnessed, under the influence of quinine, stimulants, and strong soup, an alteration for the better; after which matters steadily pursued a favorable course, and the stump healed kindly.

Contusions stand next as to number—35; but I have no record of any of them being more than simple injuries, and, as such, are not deserving of separate notice.

For a country such as Persia, where, for nine months of the year, the glare is not only intolerable, but with every breath of air that stirs, the fine sand which everywhere abounds is raised in such clouds as to render objects indistinct at a few yards' distance, it is surprising that there was so little *Ophthalmia*,—only 11 cases, and, with the exception of one instance where the inflammation implicated the deeper structure of the eye, they all readily yielded to treatment.

But few diseases more will require to be noticed, as I have now accounted for nearly the bulk of the admissions; and such

a disease as *Atrophia* might certainly be passed over without much comment were it not for certain peculiarities of our system which I think give rise to a good deal of this complaint, and which I would now beg to indicate. Of the 16 cases of debility admitted, 15 have been idiopathic, *i. e.* not traceable to previous disease or originating in a cachexia or other easily assignable cause; and a very remarkable feature in this affection is, that I scarcely ever meet with a case of it except in those who are just about completing their time of service for pension! I think it was generally noticed that, during the time the regiment was stationed at Karrack, the men were extremely penurious, and reports reached me occasionally of several who had saved considerable sums of money. One man I remember coming into hospital suffering from chronic bronchitis and dyspnœa, who, it was found, was carrying Rs. 350, or nearly equal to 9 lbs. in weight, fastened round his waist. In this case the dyspnœa was caused chiefly by the weight of the money preventing the proper action of the diaphragm. But the more common result of the men's thus "pinching their bellies to fill their purses," was the decided lowering of physical condition in those who did so; and I had many patients whose recoveries from disease were protracted solely by the asthenic condition they had themselves induced.

I noticed this matter officially to the commanding officer. Some good resulted, though it was rather a difficult and delicate business to interfere in. But these cases arose from different motives than in those I previously adverted to. In the present one—expense and scarcity of provisions, but, perhaps, still more the unsettled state of India, gave rise to this desire of amassing money at the expense of personal comfort and efficiency; and doubtless in the other cases also these circumstances were not overlooked, but rendered the men all the more anxious to represent themselves as fit subjects for the next Invaliding Committee. But the "proximate" cause which to my mind induces a certain number of men in native regiments, after some 15 years' service, to feign various diseases, of which atrophia, arising from a scanty and unnutritious diet, and chronic rheumatism are the most

common, is to be found in the hardship of the rules which preclude them from claiming their pension as a *right*, instead of, as it is at present, a state necessity after a certain time of service. A more liberal regulation in this respect would remove an immensity of discontent which I know exists on this point, and would put an end also to those anomalous cases of disease which wear out the patience of the medical officer, and not unfrequently terminate, as happened in 2 cases of this kind brought forward during the past year, in courts-martial, leading to no very satisfactory results.

Scorbutus was prevalent to a certain extent at Bushire, but this was only to be expected from the privations the men endured whilst on board-ship, and the subsequent difficulty of always procuring a sufficiency of fresh provisions. Our regiment, however, suffered comparatively little : only 12 cases of genuine scorbutus are recorded.

I have nothing particularly satisfactory to mention regarding treatment in this disease. I tried M. Garrod's plan of nitrate of potass, but without any very definite results. The same may be said of other remedies I had recourse to, including quinine and the salts of iron. I placed more dependance upon the free use of vegetables and fruit ; beer also was employed with benefit.

During the past year the regiment has been unusually strong in officers. On proceeding to Persia in February 1857 we mustered 15, exclusive of the medical staff. The returns give 25 admissions, being the number for the whole regiment only up to December last ; and after that for the Head Quarter wing. The diseases met with were various, but neither unusual nor of a serious character. Two exceptions, however, must be made here. One officer suffered severely from chronic dyspepsia, and which continued for a lengthened period in spite of every measure for his relief, but on his being sent to Bombay for change of air he recovered. The other case had not such a favorable termination. The subject of this was a young man of a highly nervous temperament, who on the breaking out of the Persian war very imprudently returned to this country from home, where he had been sent two years previously owing to chronic diarrhœa.

He joined the expedition in Persia, and shortly afterwards his old complaint returned. There was more or less pain over the umbilical region, and the nature of the discharges indicated ulceration of the small intestines. The disease showed no disposition to yield to treatment, which was in a measure partly owing to irregularities of diet. The climate and locality were unfavourable, as were also the patient's constitution and antecedents. He was sent to Bombay, but died before landing.

In consequence of our isolated position, we were unable when at Karrack to send up the old and worn-out men, with such as were incurable, to be disposed of before the usual Invaliding Committee, but a special one was ordered in Bombay for the Head Quarter wing, and another was convened in Poona for those of the left wing. Some 28 men in all were examined, but the results are not known.

The above is a general description of the diseases which have been observed most frequently in the regiment under my charge for the past year. Our having been on field service has given a slight interest to a report which is not always connected with the routine account of a regiment in cantonment; and although the sick have in consequence been more numerous, yet I am glad that in the returns there are no men figuring as having been killed in action, nor yet any from amongst them maimed or wounded.

There have been the usual amount of minor operations, such as bleeding, cupping, opening abscesses, and tooth-drawing. Nothing more important under this department has occurred, save one amputation of a leg, which has already been noticed; also a dislocation of the lower jaw, which was reduced.

The instruction of the apprentices attached to the hospital has been attended to, though from various interruptions and other causes contingent on field service it has not been so regularly conducted as was the case last year; but now that the regiment has a prospect of being again brought together, the opportunities for carrying this out will be more favorable.

In the matter of vaccination there was nothing whatever done. Of course in the first instance, while active operations were going

on, and no small-pox about, it was never thought of, especially in the entire absence of women and children. Afterwards when we were settled at Karrack, hearing that some cases of the disease had appeared amongst the Persians at Bushire, I deemed it would be a good measure, if practicable, to set vaccination agoing, not only in the regiment, but also in Karrack itself. To accomplish this, I applied for lymph to the Civil Surgeon at Bushire, but unfortunately he could not supply me, nor was there any other source from which it could be derived.

Annual Return of Sick of the 23rd Regiment N. I. for the year ending 31st March 1858.

Strength 599.

	Treated.	Died.
Fevers	200	2
Diseases of the Lungs	17	1
Diseases of the Liver	3	..
Diseases of the Stomach and Bowels	226	5
Diseases of the Brain	11	1
All other Diseases	283	3
Total	740	12

Ratio per cent. of treated to strength	123·5
Do. of deaths to do.	2·0
Do. of do. to treated	1·6
Daily average number of sick	25·7

ANNUAL REPORT OF THE 26TH REGT. N. I.

For the Year 1857-58.

BY J. E. BATHO, Esq., Surgeon.

Presented by the Director-General, Medical Department.

At the close of the last official year, the 26th Regiment, 739 strong, with 13 officers and two assistant surgeons (Drs. Barnett and Ogilvie) attached, having been selected to form part of the force under General Outram destined to operate against the Forts at Mahommerah, landed there on the 26th March 1857, the sick having been left at Bushire with the 20th Regiment. The action was chiefly naval, and the land forces were not at all engaged with the enemy on shore, as before they could be disembarked the Persians had evacuated the place and were in full retreat.

March.

The army was encamped in two divisions on a low plain of considerable extent, about a mile from the river; it bore traces of having been recently flooded, and after its occupation by our troops extremely heavy rain fell in the latter part of April, converting the soil into a deep and tenacious mud, which interrupted communication, gave rise to sickness, and added materially to the discomforts under which the men had lately suffered, *e. g.* detention on board-ship in Bushire roads for a fortnight in heavy weather, when the diet of the majority was confined to pulse; and even after the landing, matters were not much improved, for, consequent on the retreat of the Persian army, the inhabitants had abandoned the town, and the only supplies of food for many days were from the Commissariat stores.

Under these circumstances, to which were added exposure to the sun, labour in the conveyance of tents and stores from the bunder to the camp, and heavy night duties, some increase of sickness naturally resulted; it was not, however, very great,

being for the month of April only 33 in excess of the preceding month (or 84); of this number 19 were fevers, 19 affections of the bowels, 13 dysentery, 7 pulmonary complaints, and 15 contusions, &c. the effects of disembarking. The weather was becoming hot and sultry during the day, though the nights were generally cool; the maximum of the thermometer was 100°, the minimum 50°, the average daily number in hospital was 23; no casualties occurred.

April.

On the 1st of May there were 26 in hospital, chiefly cases of fever, dysentery, and diarrhœa; the whole had a sickly appearance, and 7 or 8 patients were in a feeble condition; one died a few days after in an extreme degree of emaciation from protracted fever, the fatal event having been accelerated by a colliquative diarrhœa. On the 11th May the regiment was in orders to embark for Bushire, where it arrived on the 14th; the heat of the weather had increased considerably, and there was a corresponding increase in the admissions for diarrhœa and dysentery, amounting (for the whole month) to 13 of the former and 21 of the latter; fever cases had advanced to 29; the total admissions of May amounting to 97 against 84 in the preceding month. On comparison, however, with the 23rd Regiment, pitched near the 26th, but on more swampy ground, the superior sanitary state of the latter was very manifest, as the number of bowel-complaints alone in the former regiment exceeded the whole admissions in the 26th.

May.

The disorders were not, it is true, of a severe nature, but convalescence was not speedily established, and trivial causes often reproduced the complaint; one fertile source seemed to be the use of impure water from foul ditches in the neighbourhood, from which the bheestees, if not prevented, were accustomed to bring it rather than from the canal or river, which was at a greater distance; this practice was, however, soon stopped on a representation being made of its injurious effects, and an orderly was afterwards sent with them to the river.

The dysentery, though entered "acute" in the returns, would be more properly regarded as a mild form of subacute dysentery, the stools being serous or mucous, sometimes tinged yellow with

bile, and sometimes streaked with blood, exhibiting for several days an absence of fæculent matter, and attended with slight griping and straining; mild pyrexia was sometimes present, and in the majority of cases the patients had an aspect of languor and depression of spirits.

For some time before the departure of the army from Mahommerah, the climate had become extremely warm and oppressive. At the beginning of May the mercury rose to above 100° in a good Bengal tent (with a thick numda between the flys) as early as 10 A. M. In the double-poled hospital tents it rose to 111°, and in the rowties it must have been higher than this. The effect of this extreme heat tended to produce inordinate stimulation of the organic functions of the body, while the animal functions were proportionately depressed; the biliary secretion in particular became augmented, but deteriorated, as manifested by the prevalence of jaundice and affections of the chylopoietic viscera among officers and men.

On the third day after leaving Mahommerah the regiment landed at Bushire, and on this occasion was pitched on the extreme right of the army in the direction of Bushire, less than a mile from the sea with free exposure, without any intervening obstacle to the sea-breeze, to which no doubt is to be attributed in some measure the small amount of sickness in this regiment during the subsequent months; in fact, it is worth recording that whilst scurvy was prevalent in the 4th Rifles and the 20th Regiment, which had remained at Bushire, three or four cases only, and one casualty from it, occurred in the 26th N. I., while the total number of admissions was so much smaller as to excite the surprise of the Superintending Surgeon. It must, however, be also mentioned that the former regiments had been two months longer in Persia, and during the whole of their residence had been using the brackish water of the place, to which no doubt a great deal of the sickness in the army, more especially among the native portion of it, seems to have been due, as Europeans, who were particular in procuring good water from a distance, were but little affected.

In comparison with the climate of Mahommerah, that of

Bushire appeared in favorable contrast; the North West wind blowing steadily for many weeks at this season reduced the temperature below 90°, which had the effect (after a few days) of lessening the number of admissions, as will be seen on reference to the Table appended at end of this Report.

Thus in June the number of bowel-complaints fell from 35 to 5 (all entered diarrhœa, not a single case of dysentery occurred), and the total admissions were reduced from 97 to 54. Advantage was taken of the first steamer going to Bombay to send off seven of the worst cases, of whom two afterwards died. Two casualties occurred in May; one on the 8th, as before mentioned, and one from scorbutus in a man who had been previously 25 days under treatment for fever and rheumatism; he was in a very critical state when transferred to my charge (on Assistant Surgeon Ogilvie being removed from the regiment), and laboured under urgent dyspnœa and great debility. On the following day he became violently delirious; this was soon succeeded by collapse and coma, which gradually deepened, and on the 5th day after he expired.

June.

The months of June and July presented very little difference in any respect; July was rather the cooler of the two; the admissions were almost identical in respect to the total number; to the number from each particular class of disease; and to the daily average number in hospital. Northerly winds prevailed, and the weather during these months was in consequence less oppressive than usual, though this advantage was accompanied with a considerable drawback in the shape of furious dust-storms, which, from the sandy nature of the soil, are very frequent, and not uncommonly continue night and day for days together. The annoyance from this apparently trivial cause, severely felt by the officers, was almost intolerable to the men, who possessed fewer expedients to exclude it from their tents, and during the height of it were totally incapacitated from cooking, so that compulsory abstinence was frequently superadded to other causes of complaint, and the natives became in numerous instances thin, sallow, and debilitated.

In June one casualty occurred from exposure to the direct

solar rays, on an intensely hot day; a young sepoy had been drinking in the bazaar, and was observed to fall suddenly and to become insensible, in which state he was conveyed to the hospital; in the course of the night he became delirious, and raved violently for about two hours; the period of excitement was followed by corresponding depression, muscular relaxation, and stupor, which continued till the third day, when he expired (60 hours from the time of attack), the fatal event having been preceded by almost general paralysis, the left lower extremity alone having been exempt, and this was constantly moved up and down in the bed. The treatment included the cold affusion, topical blood-letting, strong purgation, derivatives to the extremities, and the use of mercury, internally and by inunction.

July. In July there was one death from remittent fever complicated with "capillary" bronchitis, and one from bayonet-wound, the act of a murderer,—a sepoy in the regiment with whom the murdered man had formerly had a dispute. The point of the weapon entered the abdomen 2 inches above the umbilicus, a little to the right of the mesial line, and emerged on the dorsum of the left scapula on a level with the posterior fold of the axilla and $2\frac{1}{2}$ inches from it. On admission the skin was cool and damp, pulse rapid and thready, he complained much of the pain and thirst; vomited several times, and was very restless: extensive emphysema took place anteriorly and posteriorly, which increased the existing dyspnœa; a frequent, short, irritative cough added to his sufferings, which were terminated by death at 5 the following morning, 17 hours after the reception of the wound. The murderer expiated his offence by death a few days subsequently, having been hanged at the gate of Bushire.

August. August was the hottest month, and it is somewhat strange that admissions were fewer than in any other, notwithstanding that the hospitals had been pulled down, and all building materials resumed by the Engineer Department for transmission to Bombay; it is probable that this result may be attributed to the absence of all duties with the exception of occasional guards, and that the men were

in daily expectation of embarking for the Presidency. The admissions amounted to 18 only, of which 8 were for fever; the daily average in hospital was 12. The maximum of the thermometer in the hospital tent was 102°, the minimum 72°. The early part of the month was extremely warm, from the wind being at S.E., but on its changing about the 10th to Northerly, it became much more bearable.

September. On the 4th September the regiment embarked and proceeded to Karrack for water. During the stay at the island the non-cooking men were disembarked. On the 12th the ship sailed for Bombay; the weather was extremely sultry in the Gulf, but the passage down was unusually favorable, and very few were ill. On the 26th the regiment landed, and went into tents on the Esplanade. During the month two casualties occurred; one at Karrack from phthisis of long standing, and the other from chronic dysentery at sea. After a few days at Bombay, the regiment was ordered

October. off at a moment's notice against the Bheels, and continued on field service in the jungles for two months; the sick, amounting to 18, were left behind. One casualty occurred from "acute laryngitis," erroneously entered "acute catarrh." While thus engaged in active operations, very little sickness occurred; the chief proportion of admissions having been from contusions and injuries from marching over difficult and rocky mountain-paths.

November. On the 30th November the head quarters of the regiment arrived at Dhoolia, leaving a number of outposts in the disturbed districts.

December. The weather in December and January was extremely cool and agreeable; admissions few, only half the regiment having been present. The only serious case was that of an old subedar, in whom diarrhœa supervened on fever, and for some time placed his life in jeopardy, but he eventually recovered and went to his duty.

January. At the end of January the Depôt joined from Poona, bringing a large number of recruits; of these one had died on the march, and another, in a

very precarious state on arrival, died a few days after of malignant sore-throat.

February. In February and March admissions have considerably increased; the majority being from the ranks of the recruits, who are at drill for several hours daily, the weather having become latterly extremely hot and oppressive.

March. In March they amounted to 74, of which 38 were on account of fever of a more continued form than previously; three deaths occurred; one a subedar lately returned from escort duty to Mhow, much exposed to the sun, ill 19 days with fever; another, an old havildar from ardent fever, ill five days before admission; the third from phthisis.

Having now passed in review what I conceive to be the chief points of interest regarding the medical history of the regiment during the past official year, I conclude with the insertion of a Table showing the total admissions for every month of the year; the number of admissions for fever, bowel-complaints, rheumatism, thoracic affections, contusions, and other diseases; the daily average number in hospital; and the number of casualties.

	Strength.	Total Admissions.	Daily Average.	Per-centage of daily average Strength.	Per-centage of treated to Strength.	Fevers.	Bowel-Complaints.	Rheumatism.	Thoracic Affections.	Contusions.	Other Diseases.	Died.
April	752	84	23	3·0	12·0	19	19	6	7	16	17	..
May	744	97	31	4·0	16·0	29	34	5	4	8	17	2
June	742	54	20	2·6	11·0	24	5	5	3	3	14	1
July	739	51	21	2·8	10·0	23	5	6	1	5	11	2
August	736	18	12	1·6	4·0	8	1	3	..	..	6	..
September	736	22	7	1·0	4·0	4	6	1	2	4	5	2
October	596	60	11	1·8	12·0	22	5	8	..	17	8	1
November	405	45	10	2 5	13·0	8	5	2	2	21	7	..
December	365	18	9	2·6	10·0	6	1	..	..	3	8	..
January	321	23	9	2·7	12·0	13	..	3	..	5	12	..
February	531	51	19	3·6	14·0	16	5	4	1	..	25	1
March	640	74	23	3·6	15·0	38	1	4	1	6	24	3
Total	..	607	..	..	..	210	87	47	21	88	154	12
Average	610	..	17	2·6	11·0	..	..	..	..	..	..	..

ANNUAL REPORT

OF THE

1ST BOMBAY EUROPEAN REGIMENT, FUSILIERS (HEAD QUARTERS.)

For the Year 1857-58.

BY D. COSTELLO, M.D., Surgeon.

Presented by the Director-General, Medical Department.

The regiment during the past year, although not having the good fortune to share in brilliant operations, has performed arduous and trying duty, having been employed to watch fifteen hundred disarmed sepoys, and to confirm by its presence the loyalty of two armed corps, besides guarding one of the most important arsenals in the Punjaub. It has been located in a deadly climate,—lodged in unsuitable buildings—and has suffered from the effects of over-crowding and deficient ventilation in barracks.

During the month of April 1857 the regiment was joined by one hundred recruits, who were not in good health, having suffered from a lengthened residence in Fort George, where, exposed to the demoralising influences consequent on a residence in Bombay, and unprovided with a sufficient establishment, it is difficult to maintain that strict military discipline and supervision necessary for the preservation of the health of a body of young and inexperienced soldiers recently arrived from Europe.

In May 1857 rumours of the existence of serious disaffection amongst the great body of Native troops in Bengal,—obscure at first,—soon became more distinct and circumstantial; and on the 21st May the alarming intelligence of the mutiny at Meerut, and the capture of Delhi, with its concomitant horrors, reached Kurrachee.

The Commissioner, Mr. Frere, immediately resolved to send every available soldier to the Punjab, and the regiment was forthwith warned for service, having just then received back into its ranks 182 volunteers which it had furnished to the 2nd Bombay European Light Infantry when the latter corps proceeded to Persia. No movement of troops could have been undertaken under circumstances of greater difficulty,—the terrific heats then prevailing in Lower Scind, and the results of former dear-bought experience, forbad the idea of marching,—the Indus, swollen by the melting snows of the Hymalayas, then at its highest flood, was comparatively useless,—and the efficient steamers heretofore employed on the river were in Persia. The few that remained were old, worn-out, and repeatedly reported as unsafe and unfit for service; moreover, it was a matter of doubt, even if patched up, they were of sufficient power to stem the formidable rapids of Bukker. It was proposed therefore to embark the entire regiment in covered country boats, and to sail up the Indus, with the aid of the Westerly winds then usually prevailing, but this proposition was not carried out.

On the 28th of May, after many delays, 200 men were embarked on board the steamers "Nimrod" and "Jhelum," with orders to push on quickly, and if possible to take advantage of a temporary fall in the river so as to pass the rapids at Bukker before the current became too powerful. This was fortunately accomplished, and these vessels, after landing their troops at Mooltan, were employed during the remainder of the season between Bukker and Mooltan in conveying troops brought from Kurrachee to Sukker in less efficient steamers; the entire regiment was thus moved up by detachments of 200 men each.

Each detachment, previous to embarkation, was medically inspected; care was taken to weed the ranks of old, sickly, and worn-out men, who were sent to the Depôt, and none but active, healthy, able-bodied soldiers were allowed to embark. When proceeding up the river the men were furnished, at my recommendation, with lime-juice, and the usual second dram of spirituous liquor was discontinued. Cold bathing was encouraged, and as there was no danger from malaria during the rise of the river,

the troops slept on the river bank each night, thereby allowing the decks of the steamers to be cleaned and well ventilated. By adopting a few sanitary precautions, a body of more than 800 Europeans were conveyed in good health during the prevalence of the greatest heats, a voyage of 800 miles up the Indus, although daily undergoing great exposure and fatigue, having frequently to assist in warping the steamers against the stream, working often with the thermometer at 110° under the ship's double awnings. Shortly after the arrival of the regiment, the left wing was pushed on to Lahore, and afterwards to Ferozepore, whilst the Head Quarters remained at Mooltan.

The cantonments of Mooltan, a position of considerable strategic importance, was almost entirely held by Native troops previous to the late outbreak; its climate, want of proper barracks, and the prevalence of malarious fever, rendering it deadly to Europeans. Its garrison consisted of a regiment of Irregular Cavalry, a troop of Native Horse Artillery, two regiments of Native Infantry, a regiment of Seik Infantry in civil employ, and about 200 Mooltan Horse employed as police. The only European troops in the station were, a weak company of Bengal Artillery, with a bullock battery attached. The European Artillery were formerly lodged in the "Bomb-proofs" in the Fort, but these residences were found too hot, and the Fort being allowed to fall in ruins, a well-raised, well-ventilated, and commodious barrack, calculated to contain a company of Europeans, was erected in camp. Up to the present moment, this is the only suitable residence for European soldiers. The cantonments are situated in 30° 10″ 40′ North latitude, and 11° 28″ East longitude, about five miles distant from the banks of the Chenab, lying in the bend of the Wallee Mahomed Canal, which separates the cantonments from the city and Fort, distant about two miles. This canal, 35 miles in length, and used both for the purposes of irrigation and traffic, brings the waters of the Chenab from the village of Bawsee Bustee, distant 20 miles. The canal is only full during the hot season, and has then a depth of about 12 feet of water. It occasionally overflows and floods the surrounding country for many miles, becoming the source of much

suffering to the inhabitants, who perish in great numbers from fevers which prevail when the water recedes. The site of the cantonments is a perfect level, admitting of no drainage; the water from the overflowing of the canals, or after a slight fall of rain, remains on the surface till dried up by the sun. The soil consists of a stiff clay, very cohesive and non-absorbent, in many places covered with saline efflorescence; the under stratum is sandy, porous, and absorbent; water is invariably found at the depth of sixteen feet: it is pure and well-tasted. The lines of the Native Infantry are built of mud and flat-roofed, and in squares, offering strong military positions if resolutely defended. The hospitals, store-rooms, quarter-guards, arm-bells, and all the Government offices belonging to the Native regiments, are substantial buildings, built with burnt bricks, and roofed with tiles or chunam. The cantonment is well laid out, with roads planted with trees, presenting an agreeable *vista*, and contrasting favourably with cantonments in the Bombay Presidency. The officers' houses are built of unbaked bricks and flat-roofed; the compounds are spacious, planted, and kept in neat order, each compound being surrounded by a low mud wall, instead of the prickly-pear hedge which disfigures our Bombay Presidency cantonments. The climate of Mooltan is dry, the fall of rain being small in quantity, and irregular. The range of the thermometer during the different months is extremely variable; the months of May, June, July, and August are fiercely hot. In no station throughout India does the sun's rays seem more powerful; hot winds from all points of the compass usually prevail day and night, and dust-storms are frequent; the nights are hot and sultry, the mornings oppressive. In September and October the mornings become more endurable; November is an agreeable month, and in December, January, and February the nights are bitterly cold, and fires are required during the entire day. The air then is unusually clear, the snow on some of the lofty peaks of the Tukt Sullima range being distinctly visible at a distance of more than 100 miles. The month of March, and part of April, are agreeable, but about the end of the latter month the weather rapidly becomes hot.

The barrack accommodation allotted to the Head Quarter wing of the regiment, since its arrival at this station, has been the Artillery barrack, the building known as "the 69th Hospital," and some "Bomb-proofs" in the Fort at Mooltan, distant about two miles. The Fort itself is nearly in ruins, its repairs having been neglected since its capture by the British. The hospital is the one formerly used by the 62nd Regiment of Native Infantry, and exactly similar to that of the 69th.

The Artillery barrack, a building just completed, is constructed much on the plan of one of the new barracks at Kurrachee. It was built to accommodate one hundred men, allowing one thousand cubic feet for each man, but it was occupied by 250 men of the Bombay Fusiliers, and, therefore, contained double the number it should have held, with a due regard to the comfort and health of its occupants.

"The 69th Hospital" (about 150 feet long, with centre walls eighteen feet high, including a centre room twenty feet broad, and a verandah ten feet wide, with an outer wall fifteen feet in height) is capable of containing about sixty men, but was occupied by one hundred. It is ventilated by a number of doors, 6-6 × 4-6 feet wide, with two openings in the roof. It is situated in the most unhealthy part of camp, close to the sepoys' huts, is damp, and gloomy. The admissions from fever occurring amongst the men quartered in this building were so severe and numerous, that its occupants have been, at my recommendation, frequently changed.

The domes or "Bomb-proofs" occupied by the remainder of the wing consist of a range of buildings on the East side of the Fort, about fifteen in number; each dome contains a square room of fifteen square feet, with walls nine feet high to the spring of the arch, and fifteen feet to the apex of the dome, the floors of earth highly impregnated with saline efflorescence, are situated about three feet below the surface of the ground outside; in each apartment on the East side is a very small window, and on the same side there is only one small door for the entire range of buildings; on the West side is a low enclosed verandah 10 × 10 feet, with doors of solid plank 6 × 4 feet, and opposite each verandah outside

there is an open verandah. These buildings are, I should venture to assert, amongst the hottest in the world. The tops of the domes are exposed to the fierce rays of the Mooltan sun, retain their heat so as to render their interiors as so many ovens; each dome contained six cots, but being so much below the doors, the men lying on them do not feel the cool air of the tatties when in use. The party occupying these buildings suffered so much as to necessitate their relief every fourteen days.

The country about Mooltan does not at present afford any great facilities for provisioning European troops. Beef is excellent and plentiful, but mutton is poor and tasteless, far inferior to the meat issued at Kurrachee and Poona; the bread is bad—some of the worst I have seen in India, although every exertion to procure good bread has been made by the Commissariat. The cause of this inferiority I believe to be in the wheat grown about Mooltan, which, although an excellent grain in appearance, will not when in flour work up well into bread. It is now proposed to get flour from Lahore, where the bread is excellent, being made from wheat grown on the spot.

The only vegetables procurable in the bazaars are of the commonest kinds usually met with in India. Europe vegetables are raised in the gardens of the officers, but have not been cultivated by the natives as an article of profit. Turnips are, however, grown in great quantities, and are used as food for cattle; they are chiefly cultivated on account of their seed, which is an article of commerce, and furnishes an oil used for edible purposes; the turnip itself is poor and tasteless. Potatoes grow in Mooltan in small quantities, but the bazaar is supplied from Ferozepoor; they are consequently scarce, expensive, and only to be purchased during the cold season. The fruits procurable during the hot season are mangoes, dates, pomegranates (which are much used in making sherbet); jambuls, grapes, melons, and small peaches, during the cold season. The bazaars are well supplied with fruits from above the passes; large quantities of limes and oranges are brought from Bawalpoor; the oranges are excellent and cheap.

The duty has been unusually severe during the time the

regiment has been at Mooltan: fire-arms were always kept loaded; the picquets and sentries very numerous. The men in consequence suffered much from fatigue and want of rest during the months of October, November, and December when sickness was prevalent. The men have been frequently on duty for three consecutive nights.

Mooltan, unfortunately, affords great facilities to the soldier in indulging in the fatal vice of intemperance. An ardent spirit made from dates is used by the Seik population, and is easily obtainable, in spite of the exertions of the civil authorities. The regimental records, however, do not show any unusual amount of crime. Eighteen men were tried by court-martial during the past year; of this number twelve were for habitual drunkenness, 255 were punished by the decision of the commanding officer, including 97 for drunkenness. The men suffered much during the last year from the want of those amusements which were so liberally provided for them at other stations with a view to preserving them in good health. Mooltan does not afford even a common fives'-court. There were no books for the amusement and instruction of the studious, who are a very large class in the regiment, the regimental library having been left at Kurrachee.

During the past year the average strength of the Head Quarter wing has been 465, the number of cases admitted into hospital 1,853, and the number of deaths in hospital 13, viz. 3 from "remittent fever," 3 from "dysentery," 2 from "hepatitis," 1 from "rupture of the spleen," 2 from "apoplexy," 1 from "phthisis pulmonalis," and 1 from "cynanche tonsillaris."

Annual Return of Sick of the Head Quarters of the 1st Bombay European Regiment (Fusiliers) for the year 1857-58.

Stations.—Kurrachee and Mooltan. Strength.—465.

Diseases.	Treated.	Died.
Fevers	1,366	3
Diseases of the Lungs	26	1
Diseases of the Liver	40	2
Diseases of the Stomach and Bowels	82	3
Diseases of the Brain	40	2
Others Diseases	348	2
Total	1,902	13

Ratio per cent. of treated to strength	409·0
Ditto of died to ditto	2·7
Ditto of ditto to treated	0·6
Average daily number of sick	48

Two of the fatal cases of "*remittent fever*" occurred in sickly men left at the Depôt, but afterwards sent up to Shikarpore, where they were immediately struck down with fever, but instead of being returned to Kurrachee were, with other worn-out and sickly men, sent on to Mooltan, where they only assisted to fill the hospital, already over-crowded. One of them was admitted from the steamer, *moribund;* the other rallied for some time, but eventually succumbed to the disease; the third was the case of a young soldier who had several previous attacks of intermittent fever. He was admitted into hospital on the 12th of November with remittent fever, which was succeeded by a slight diarrhœa; this was soon checked by ipecacuanha, quinine, and opium, with turpentine stupes to the abdomen. He became convalescent, but about 10 P. M. of the 25th he was suddenly attacked with excruciating pain in the abdomen, with rapid sinking of the pulse, and died at 1 A. M. On dissection, intense inflammation of the peritoneum and intestines was seen, the folds of the intestines being glued together; a small perforating ulcer was found in the jejunum, allowing the escape of the contents of the intes-

tines into the sac of the peritoneum; the jejunum itself was much thickened and congested, in some places almost black, the remaining small with the large intestines were only slightly congested.

Three deaths from "*dysentery*" included a sickly man from Shikarpoor, who suffered from intermittent fever, and had contracted dysentery on board the steamer *en route* to Mooltan. After death the intestines were found glued by bands of lymph, their mucous coat softened throughout its entire length, with extensive ulceration of the large intestine. The other cases were men who suffered from previous attacks of intermittent fever. In one subject an extensive abscess in the lobulus quadratus of the liver existed.

In the two fatal cases of "*hepatitis*," the men were of previous intemperate habits. In that of "*splenitis*" a rupture took place in consequence of a fall, the man having suffered from previous attacks of intermittent fever. On opening the abdomen, the sac of the peritoneum was found to contain a quart of clotted blood. The spleen was greatly enlarged, its anterior and posterior edges lacerated more than an inch in extent. In each instance, the depth of the laceration was about one and half lines, the edges gaping, the surface of the spleen soft, friable, breaking up into a pulp on the slightest pressure.

One of the fatal cases of "*apoplexy*" was that of a stout man of full habit of body, struck down by the terrific heat near Shewan; the second an active healthy man, of temperate habits, found dead in bed at the Fort. The attack was produced by the suffocating heat of the domes in which he was quartered. In the fatal case of "*cynanche tonsillaris*," the operation of tracheotomy was performed without success. On a *post-mortem* examination, the seats of two large abscesses emptied of their contents were visible; the trachea contained a quantity of pus, and its mucous membrane was highly congested.

The admissions under the head of "fever" show a great increase over those of the former year, being 1,359 from an average strength of 465 men, as compared with 234 from an average strength of 880. The nature of the disease, and the

severity of its form, were also much greater during the past year. The cases of remittent fever were 69 as compared to 10 of the previous year; of the ephemeral form only 4, and of the common continued only 28. The universal prevalence of fever, the rapid enlargement of the spleen, and the severe form of the disease, are at this station developed under the most favourable circumstances, Mooltan possessing in its locality the three great requisites for generating miasma, viz. an alluvial soil, great heat, and the overflowing waters of the Chenab evaporated by solar influence.

The following is a table showing the prevalence of fever during the different months of 1857-58, being the number of monthly admissions into hospital from that disease:—

		1857.	
Kurrachee	.....	April	9
Do.	.....	May	3
En route	.....	June	3
Mooltan.	.....	July.....	11
Do.	.....	August.....	42
Do.	.....	September ..	186
Do.	.....	October	315
Do.	.....	November ..	346
Do.	.....	December ..	227
		1858.	
Do.	.....	January	116
Do.	.....	February....	67
Do.	.....	March.....	40
		Total....	1,365

It will be observed that the admissions from fever increase in number during those months when the water is receding, and when malaria is consequently generated. The number of persons who escaped attacks of fever during the past season were only 34, of whom 11 belonged to the band or regimental staff, and had no night duties to perform.

Having already stated the general principles which guide my practice in the treatment of malarious fever, it will not be necessary to recapitulate them. I shall only remark that, notwithstanding the distressing vomiting of dark fluid, purging of

bilious matter, head-aches, or pneumonic symptoms which so frequently complicate the fevers that are met with at Mooltan, all depletive measures, calomel, emetics, antimonials, were carefully avoided; the chief dependance was placed on antiperiodic remedies.

Under the head of "diseases of the brain" a large number were from "sun-stroke." I have been fortunate in the treatment of these cases, not having had a single death. The measures used were—after immediately removing the clothes,—continually pouring cold water from a height on the head, face, neck and chest, —the internal administration of brandy and ammonia. Severe spasms of the back and lower extremities, when present, were relieved by 20-minim doses of chloroform every forty minutes. In all cases head-ache with throbbing of the temples persisted for some days, and was treated by rest, and the administration of tartar-emetic and tincture of opium. There have been two cases of "*delirium tremens*" during the year; these were easily controllable. "*Venereal affections*" have been proportionably as numerous as those of the past season, but syphilis is comparatively mild at Mooltan, and gonorrhœa easily subdued. "Scorbutus" has been very general during the past year. The regiment suffered severely from the disease at Aden, and did not escape from it at Kurrachee; hence living in unsuitable buildings, and performing hard duty whilst at Mooltan, aggravated the disease. Scurvy also is endemic at this station, the occupants of the Jail occasionally suffering severely from it, although remarkably exempt from other diseases.

Fifty-four men were sent from Mooltan to the Sanitarium at Ghizree; the cases were men completely broken down from continued fever with enlarged spleen, or suffering from scurvy. Several have already returned to duty, having received great benefit from the change.

ANNUAL REPORT

OF THE

LEFT WING 1ST BOMBAY EUROPEAN REGIMENT (FUSILIERS).

For the Year 1857-58.

By J. F. STRAKER, Esq., Assistant Surgeon.

Presented by the Director General, Medical Department.

This is necessarily a most imperfect report. I only took charge of a detachment, and then of a wing, in June 1857, when this portion of the regiment left Kurrachee suddenly for the Upper Provinces, and during marching it was impossible to keep detailed records. At the end of May two detachments only started for Mooltan, where, though by no means of the proper strength, they were pushed on to Lahore* as a wing. I was in charge of the second detachment. The heat on the river Indus was very great, the thermometer varying from 120° to 130° on deck, where the men were much crowded. In our steamer there was, luckily, a double awning, but the other boat had only a single one. There was only one necessary for all the men, and besides the usual tendency to costiveness on board any vessel, there was so much delay and difficulty in getting to this one privy, that gradually the men put off the habit of going regularly to the rear, and allowed their bowels to become much bound. The nights, however, were almost invariably cool, and together with this advantage, and the excitement of seeing service, and inability to get more than the proper amount of liquor, kept them in excellent health during the passage up. On the night we reached Mooltan,† a young soldier died almost sud-

* June 24th, 1857. † June 20th.

denly of "sun-stroke." Three days after, we started for Lahore. The first march was, as usual, a very short one. The second was 18 miles, and then the combined effects of heat, constipation, and probably the extra liquor (eagerly imbibed while there was a chance during the short stay at Mooltan), showed themselves. Four men were admitted in the course of the morning, none of whose bowels had been open for five days, who had eaten nothing for several days from entire loss of appetite, but had of course taken their drams, and indeed a good deal more if the truth had been known. They were all suffering more or less from sun-stroke, great head-ache, intense heat of skin, and much increased circulation. Purgatives were freely administered, and leeches and cold applications applied to the head; to some blisters were put on the nape of the neck. They all gradually got worse, and by 12 o'clock, though their bowels had been well opened, two of them were delirious. The heat was then so intense, the thermometer in the double hospital tents even being 120°, that I at once removed them all to the passages and corner rooms of the Serai, from which the Officers at once turned out. I opened the veins of the arm in two of them; this had so little effect that I divided the temporal arteries in the third, but with so little success that a large blister was put all over the head of the fourth. All this was totally opposed to every former principle and practice I had adopted, but to my inexperience of Indian disorders, especially those brought on by the sun, the symptoms were so sudden and rapid, I thought no other chance of life was left. The first three died that night, and the fourth the next morning. Had I repudiated all traditional memories as to bleeding and blistering being the only thing in India, and at once adopted the treatment I afterwards pursued, I cannot but think that some of these men might have recovered.

The next day a most timely shower changed not only the temperature, but the electric condition of the atmosphere, and as I had been obliged to report that to proceed would be hazardous under such conditions, jowarree tatties for each tent, and pugries, were sent out from Mooltan; and the rest of the march, though trying enough, was performed without any more fatal cases.

In fact the causes which produced them had ceased to exist, namely the intense and still heat, constipation (for the men now took an interest in keeping their bowels open), extra liquor without a proper amount of food, and the want of proper protection to the head.

The wing arrived at Lahore on July 11th, and though no more acute cases had then occurred, some of the men suffered from a sort of general semi-paralysis, from which they took long to recover, but without any permanent injury. Our last march into Mean-Meer was a severe double one, and the heat was again so intense that several more cases of sun-stroke occurred, four of which were fatal, because the men were brought in too late, and no amount of water dashed from a height over them revived them for a moment. The rest brought in earlier were, I am happy to say, restored by the douche, which was now used in every case. The moment a patient came in, he was stripped, and the contents of a mussuck of water poured over his head and chest, especially the latter, from as great a height as possible, great care being taken that the water did not get into the mouth, for the epiglottis was not usually in a very active state. The first effect of this was to start and rouse the patient, next to diminish the intense heat of skin, and gradually stop the bounding arterial throb. Generally the force of the circulation was so rapidly checked, that not even the contents of one mussuck could be borne, and the douche had to be stopped; hence the necessity of a most careful observation of the pulse the whole time; the douche had to be repeated, however, very soon, for the heat and throbbing quickly recommence and spread, and would gradually recover their former pitch, if not checked from time to time. The legs were kept immersed during the same period in the hottest bearable water, and at the earliest opportunity, fifteen grains of calomel and one or two drops of croton oil placed on the back of the tongue. In one very bad case the douche had to be kept up, interruptedly, for several hours, the man having been brought in late, and when I arrived to see him was quite insensible and breathing stertorously. I observed that on the first dash of the water he gave a start, but again

relapsed. This I believe is a favourable prognostic symptom, for I had the satisfaction of seeing the man recover; he was ill, however, with great tendency to head symptoms for a long time; and was so weak and so slow in recovering his strength that I had to send him subsequently to Kurrachee.

On July 21st we marched for Ferozepore. On the second day a tall, strong, handsome color sergeant fell another victim to the sun. His was, unhappily, a hopeless case from the first, for he was brought to hospital in the last stage. All the men in his tent had, as usual after breakfasting, fallen fast asleep, and did not know he was ill, till some of them were awakened by his loud snoring, and found him speechless, with his face against the ground. I heard afterwards that he had been drinking heavily the day before.

During the time the wing was at Ferozepore there was comparatively little sickness, except from accidental causes, and the number in hospital was generally low. I think Ferozepore a most healthy station, and with the new barracks and a proper drainage, it will be one of the best places for Europeans in the Upper Provinces. Four deaths occurred—one from "Bright's disease of the kidney"; another from "abscess of the liver" (reported "pleurisy," because at first it seemed to be in the pleura, but the abscess being situated close under the diaphragm had burst into the lining membrane of the lung just above). The third was exhaustion from "secondary syphilis," which attacked the fauces and bones of the nose. It is reported as "cynanche tonsillaris," with which it began. The fourth death was from accidental causes. The invalids of the season, being principally the broken-down and mutilated men from Delhi, remained at Ferozepore for more than a month, and as they had most of them saved considerable sums of money, and did not care for anything now they were on their way home, each man not only appeared to find a long-lost brother in our wing, but fraternised with at least six more of his comrades; the imbibition became considerable, and I had several cases of "delirium tremens." One of these, being a very old man, of long service, who had similarly suffered much in former years, died.

There were two other fatal cases, but they occurred suddenly out of hospital, and so are not reported among the deaths. One was from congestion of the brain, as the men were marching to the Fort to relieve guard. I found no lesion of the brain,—congestion only. The other was from the bursting of an anuerism of the aorta just below the arch in the descending portion, before it passed under the diaphragm where the artery rests almost on the dorsal vertebra, whose bodies were worn by the dilating sac of the tumour, which was firmly adherent to the bone. He had long presented the usual symptoms; but from the spot in which "bruit" was heard clearest being near the umbilicus, I had diagnosed the tumour to be a small one of the abdominal aorta, until towards the end when he had severe darting pain in the upper part of the back, shooting round his body from the spinal column.

On the 10th March we started for Umritsur, where we arrived on the 18th. I wish I could report as favorably of its salubrity as of Ferozepore. Of course, until proper accommodation is provided for the Europeans, it is impossible to judge how far the greater amount of sickness is influenced by the place itself, for with the present arrangements so many causes seem to combine to make it more unhealthy :—the men are made ill by bad accommodation, and are prevented from getting well by still worse hospital arrangements. The chief sickness seems to occur in the Fort, where a portion of the men, who mount at the quarter-guard, sleep outside in the open air, from want of space, and their beds are not far from the ditch, where water has been stagnant ever since the rains; and it has only been since that period that dysentery has appeared. There have been, however, some cases among the men in cantonments, showing that the malaria from the Fort-ditch is not the sole, though it may be the principal cause. I believe some of these evils will shortly cease, for one barrack is at length approaching completion, and when that is fit to be occupied, the Native Infantry Hospital will be given up for my patients. In speaking of the dysentery cases I have referred to a much later period than what this report should embrace, but it has been done in order to show the great want of accommodation.

Going back, then, to the subject of the report, out of the 14 deaths reported 12 may be said to have been from preventable causes. I mean, that if, in the passage up the Indus, the men had been all made to throw large quantities of water over their heads each morning; if they had been made to take greater care of their bowels; if all the steamers were obliged to have thick double awnings (the one on which the four men embarked who were so simultaneously killed by sun-stroke, had only a very old single awning, riddled with holes from the fall of burning embers from the funnel); if the tatties and pugries which were sent to us after the fatal cases occurred had been supplied before we started from Mooltan, so many cases of sun-stroke might have been averted.

Again, I think at all stations where "coup-de-soleil" is not uncommon every hot weather, hospitals should be fitted up with some means of giving the douche without a moment's loss of time. Even the time taken by the water-carrier to go and fill his mussuck is often, I believe, too precious to be lost; some very simple arrangement of cistern and ordinary water-spout with a tap would be quite enough to secure a continuous stream of water from any required height.

Thus, though the wing has escaped all direct injury from the mutiny,—the only accident when the 10th Cavalry broke out at Ferozepore, was when one of the men got so elated by easy victory as to lose his senses towards evening, and sprained his ankle, —yet the indirect loss has been large, but I believe preventable on future occasions by greater experience, and a more careful forethought.

Annual Return of Sick of the Left Wing 1st Bombay European Regiment (Fusiliers) from 1st June 1857 to 31st March 1858.

Camp Umritsur, 1st April 1858.

Strength 355.

	Treated.	Died.
Fevers	197	1
Eruptive Fevers	2	..
Diseases of the Lungs	15	1
Diseases of the Liver	7	..
Diseases of the Stomach and Bowels	37	..
Diseases of the Brain	24	11
Dropsies	4	..
Rheumatic Affection	23	..
Venereal Affection	66	..
Abscesses and Ulcers	26	..
Wounds and Injuries	23	..
Diseases of Eyes	7	..
„ Skin	1	..
Other Diseases	23	1
Total	455	14

Ratio per cent. of treated to strength	128·0
Ditto of deaths to ditto	3·9
Ditto of ditto to treated	3·0
Daily average number of sick	15·7

ANNUAL REPORT

OF THE

DEPOT OF THE 1ST BOMBAY EUROPEAN REGIMENT (FUSILIERS) AT KURRACHEE.

For the Year 1857-58.

BY SURGEON D. GRIERSON, M.D., Staff Surgeon, Kurrachee.

Presented by the Director-General, Medical Department.

The 1st Bombay European Regiment (Fusiliers) marched from Kurrachee on June 6th, 1857, when there were left in the Depôt of the regiment 135 men along with all the women and children of the regiment under the command of a Captain. The number of sick who came to hospital was 32; and the average number of sick, for the ten months now being reported on has been 17. The general or average strength has been 117, and the number treated 308. Of deaths there have been 10. On these facts it may be necessary to observe that neither the number of sick at first left with the Depôt, nor the average sick for the whole of the ten months, bear the ratio they ought to do in ordinary circumstances to the strength; for first, the whole sick incapable of marching were sent to the Depôt, when the Head Quarters went away, and again after the season at Mooltan had disabled some men there, they came, some few direct, and a good many first to Ghizree, and then after a while some of these came to the hospital of the Depôt, and some who joined the Depôt, reported fit for duty, have been frequently inmates of the hospital. Nor was this the only cause, for of the recruits who came from England, those who fell into bad health became incumbents of the hospital, and several remained behind to swell

the sick list. Of the first class were the several invalids of the season, 24 in number, who were all left in the Depôt, and some of them in hospital; and of the two latter classes several yet remain in hospital. That the circumstances of the case were peculiar is evident, from the fact already stated, that with a strength of 117, the admissions in ten months were 308; but this fact, as I have attempted to show, was not due to any extraordinary unhealthiness of the year, or other specific cause of sickness of unusual severity, as might at first sight be concluded. The cause is found in this, that the whole sick of the regiment were thrown upon a small strength, which was the immediate cause of the disproportion, and afterwards by accessions of the most unhealthy men of the regiment, and of the recruits, who are frequently under the necessity of resorting to hospital, the disproportion—which in process of time, and especially after the invalids went to Bombay, would have disappeared—was kept up to a great degree. The mortality was ten, a number which amounts to 8·5 per cent. of the strength. This too is elucidated by the circumstances before pointed out, with this exception, however, that the recruits contributed nothing to the mortality; nor indeed was there amongst the fatal cases any one whose sickness was recent, or arrival in the country recent, or who had not been long in a cachectic condition, or the subject of protracted bad health. Besides, though the mortality would be remarkably high, in ordinary circumstances, it both admits of explanation by the facts before adverted to, and it is reduced to about the ordinary proportion, when the comparison is made not with the strength, which for the reasons given is not the standard, but with the admissions to hospital, and these in the condition of things existing represent more truly the necessarily great amount of sickness, and the consequent high rate of mortality. Of those who died 3 had been put on the invalid list, and died, one of phthisis pulmonalis, and two of dysentery before they left the station; and in respect to two others, this measure though contemplated was not put in execution, in consideration that prior to the time for invaliding a considerable improvement in health had taken place, and

encouraged the hope of recovery, the expectation of which was in one case frustrated by an insidious and unmanageable attack of chronic dysentery, and in the other by sudden fatal symptoms induced, there is little doubt, by the man's own imprudence, who was found to have dilatation of the right side of the heart, and of the arch of the aorta, and died of effusion into the pericardium. Besides these cases there occurred three of phthisis pulmonalis, one of hepatitis chronica, and one of dysenteria chronica. In the figured return some of these stand slightly different in nomenclature, but I prefer here to give what name the whole history, close, and autopsy of the cases declared to be their true character.

Particular Diseases.—"Fever," as is perhaps uniformly the case, has formed the largest group of disease. Besides the division of this disease into "intermittent" (with its sub-divisions), "remittent," and "continued," other classifications might be made, as "sthenic," "asthenic," or "simple" and "complicated." Perhaps most commonly the robust and healthy, and those lately come to India, undergo the active and intenser forms of fever, and in these fewer complications are likely to exist. The infirm again suffer the feebler, though commonly the most frequent attacks, and in these complications are frequent and numerous. No case of fever proved fatal, and that there should be treated 79 cases, many occurring in men greatly reduced in health, shows that this great enemy of health in this place, though continually aiming his shafts at his victims, effects far less destruction than other less conspicuous, but more insidious destroyers. This, however, is to be said, that it seems most probable that in many instances the often-repeated attacks of fever so weaken the subjects of them, as in some cases to induce morbid states, not otherwise liable to arise, and in some to accelerate or even originate the development of various diseased tendencies. Illustrations of this statement might be given, but that cannot be a very needful office in this place. It is more to the point to observe that fever by these indirect modes of action peculiar to it, or resulting from it, works much evil, and no doubt cuts off many lives. And this fact invests the management of this dis-

ease with great importance and interest. Amongst the commoner of the consequences spoken of must be reckoned enlargement of the spleen, and diarrhœa or chronic dysentery. The former complaint shows great readiness to manifest itself in fevers in Sindh, and the worst cases ever witnessed by the writer have been in this Province. It is not rare to see cases of enlargement amongst natives, where, from length of standing and general adaptation of the system to the diseased state of the spleen, cure is not only hopeless, but the attainment of it not even necessary to the enjoyment of what seems to be good health. But other cases differ in this respect: the tumour of enormous size presses on and obstructs the functions of important parts; ascites supervenes, and most likely, after emaciation and suffering, diarrhœa cuts off the feeble remains of life, and consigns the sufferer to the grave. But this is perhaps a rare termination, and should never be seen in any regiment, where fever patients are necessarily under immediate and constant supervision. For the cure of the disease in the early stages is not difficult, and to overlook the existence of the disease, or omit appropriate means of cure, would be blameworthy. Various are the compositions which have the name of spleen mixtures, and iron is the ingredient which is most constantly relied on to produce the desired cure. It is not, however, necessary for this purpose, and is no specific in the disease. A combination of zinc and aloes in the sthenic cases, or of zinc, aloes, and hyosciamus in those which are asthenic, in the form of pills, is the means which has been used in the Depôt hospital. It is not necessary to detail the experience or reasoning, or both, which not recently led to the adoption of this practice. It may suffice to say that the object of it is to induce a gentle relaxation of the alvine canal, and that when effective for this end, the enlargement quickly disappears. Whenever the diseased state of the spleen is conjoined with diarrhœa, there may be occasion for a different treatment, before that explained can be put in practice; and as is very generally known mercury, in these and all spleenic disease being injurious, is avoided. As regards the fever itself in such cases, diaphoretics and alkalis seem preferable, and quinine to check accession is given in more powerful

doses than in ordinary cases. Quinine does not appear to aggravate the complaint, but every subsequent accession of fever may markedly increase it, and for this reason prompt and large doses, ten grains for instance, are justified. In the sthenic cases of fever mostly free of complication, especially when heat is great, and the stomach irritable, nitric acid diluted in ʒi. doses generally with five or ten grains of potassa nitras is given; and no medicine is known more grateful or more beneficial in the accession of fever than this is. To this as a vehicle, when it seems necessary, quinine may be added; and with the aid of an aperient dose as occasion may require, or a small quantity of sulphate of magnesia (v. or x. grains to each dose added to the mixture,) a fever of this class may be easily, quickly, and it may be said pleasantly, cured.

In the class of "*diseases of the lungs*" the admissions have not been numerous, but of phthisis pulmonalis three cases proved fatal. Two occurred in men of weak constitution who had often been sick in hospital, and one died very gradually; the other from affection of the larynx; and the third was a young man who came from Mooltan, went to Ghizree, where he stayed but a few days, came into the Depôt hospital, and sunk rapidly from chronic diarrhœa. This station seems unfavourable in the influence it exerts over this disease, which when it reaches a certain stage of development proceeds rapidly to a termination. Except phthisis, the other chest affections have been little worthy of note.

The fatal case of "*chronic hepatitis*" occurred in a man long the subject of bad health, and proceeded to work great injury and destruction of parts. The man fell into a state of extreme debility, nervousness, and almost imbecility. Pain of the hypochondrium was never a prominent feature of the complaint, but the pain of the side below the axilla was latterly severe and constant. A great cavity was found in the upper portion of the right lobe of the liver, a perforation of the diaphragm existed, and an immense collection of pus occupied a space formed by the abscess of the liver at one extreme, and the upper part of the right half of the cavity of the chest at the other. It does not appear

that acute symptoms of hepatitis were ever very prominent, and perhaps most of the ravages of this insidious disease took place out of hospital. The man was a young soldier, whose wife and two children died before himself. How far grief generated or aggravated the disease is not known. In "*diseases of the stomach and bowels*" there stand three cases in the return, but one of those included under syphilis consecutiva might be joined to them, for the fatal termination was induced by the disease of the bowels, a dysentery, which proved fatal in a fortnight. This case of dysentery, and one other, also fatal, were sent in from Ghizree, and as they resembled each other in being both cases of long-standing syphilitic disease, so they were similar in running rapidly on to death, and received no check by change or medicine; so that removal into cantonments was of no avail. One other case of this kind of dysentery which had a quick and fatal course, in a debilitated constitution, occurred in a man weak, pallid, and cachectic, liable to slight œdema, vertigo, and dimness of sight. This man had long been in hospital, a dyspeptic subject, underwent great improvement, was allowed to go out, and after a time returned labouring under the complaint of the bowels, which persistingly got worse; and he quickly died. A case analogous to these in its close stands under the head of carditis. This was the subject of extensive and long-standing disease. The lungs and liver gave evidence of being implicated, and he contracted a chronic dysentery, which went on unchecked, and he gradually sunk under the debility and discharges, with want of nutrition which were induced. The case that stands under the head of "dyspepsia" was different. This man came in from Ghizree pallid, emaciated, weak, with great thirst, and peculiar expression. He scarcely complained of pain, ate well, but was listless and inactive. He improved in hospital, went out, and it is said drank hard. He was admitted after a few days with slight feverish excitement, and great exhaustion. Laborious breathing soon came on, and he died. A spirituous odour, or what seemed so, was observed on opening the thorax. The heart was found under the upper part of the sternum; the pericardium contained fluid in rather large quantity; the right

side of the heart was dilated, the left if not hypertrophied, contracted; the arch of the aorta was dilated; the lungs were not of the usual appearance, but presented a pale surface, studded with greatly enlarged grey granular bodies; the stomach had a patch of red points near the cardiac orifice. Ulcerations were not detected. Under "*Venereal affections*," especially those of the secondary division, much suffering existed. Some bad cases were found, and it seemed that the fumigations which often prove beneficial had no good effect in respect to any of them. And this peculiarity was observed elsewhere last year, and two extremely bad and dangerous cases of sloughing in the primary disease, a tendency never as far as is known conspicuous before at this place, put a stop to attempts of this kind. The iodide of iron was found invaluable, and cases occurred in which the men benefited so much that they went out to Ghizree, got bad again, and were again relieved of troublesome sores by this remedy, the only defect of which is, that the good effects of it do not continue, or, in other words, it is not a specific. The primary cases have exceeded in numbers the secondary, as was perhaps to be expected, but it is hoped that this disproportion may go on to increase, by the continued diminution of secondary cases; and it is not known that any have been added out of the primary cases treated in the Depôt to the list of those subject to secondary affections for the time under review. As before mentioned, the fatal case under this head was a man sent in from Ghizree, who died of "dysentery."

In a consumptive young man, who laboured under the evil of a *fistula in ano*, after a considerable time, and the use of cod-liver oil, when he had recovered strength, the cough was gone, and he was desirous a cure should be tried, the operation was performed. The sinus was not simple, but branched out; the operation was by this complication made difficult, but was, it is believed, fully effected; however, the issue was not flattering. The wound was extremely slow to heal, and formed a considerable fissure. Pain went off, and inconvenience was little felt, but the disunited surfaces were a constant evil. He went to Ghizree; there he got fever and enlarged spleen, but no

benefit. He came again to the Depôt hospital, and was sent to Poorundhur.

A case of dislocation of the shoulder came under treatment. It was of some standing before it was reduced. Under chloroform, by the use of the pullies the reduction was effected, but it was long before the man regained free use of the shoulder, or lost the uneasy nervous pain of the fingers or the inability to exert the usual power. At last, however, all was well, and the man proceeded to join the Head Quarters of his regiment.

Of twenty-five men put on the invalid list three died, as before explained, in the Depôt hospital. The others proceeded to Bombay, and, as far as is known, with one exception, to England. The man who returned, though not robust, nor free of constitutional taint, has been since with but little exception at duty.

Annual Return of Sick of the Depôt 1st Bombay European Regiment (Fusiliers) for the year 1857-58, stationed at Kurrachee.

Strength 117.

	Treated.	Died.
Fevers	79	..
Diseases of the Lungs	30	4
Diseases of the Liver	12	1
Diseases of the Stomach and Bowels	70	3
Diseases of the Brain	6	..
All other Diseases	111	2
Total	308	10

Ratio per cent. of treated to strength	263·0
Ditto of deaths to ditto	8·5
Ditto of ditto to treated	3·2
Daily average number of sick	17·0

APPENDIX.

APPENDIX.

No. 1.

Dangerous effects of Chloroform.—By G. R. Ballingall, M.D., Assistant Surgeon, J. J. Hospital.

On July 20th, 1858, lithotomy was performed on a Portuguese about 60 years of age. The operation was rather protracted, owing to a number of calculi (fifteen) being found in the bladder. Chloroform had been for some time discontinued, and Drs. Giraud and Lownds, who kindly assisted me, had left the operating table, when, just as the tube was being inserted, I observed that the patient's respiration had ceased. The pulse being, however, still distinct, the patient was turned on his face, and artificial respiration was kept up in the manner recommened by Marshall Hall. Natural respiration was not restored till the tongue was seized by Dr. Lownds, and drawn forward with a pair of artery forceps, as Mr. Syme advises; the pain of this seemed to act as a stimulus, and he soon breathed regularly. On turning the patient, and allowing the body to fall forward again, a distinct expiration was audible, and though he was not thoroughly roused till the tongue was seized, yet this would probably have been unavailing, had not the artificial respiration allowed the effects of the chloroform to pass off. In a subsequent case, where chloroform was given for the reduction of a compound fracture of the forearm, a similar arrest of respiration took place, but acting on the effects of pain in the previous instance, I immediately gave the arm a twist, which instantly caused an effort of inspiration. I would throw this out as a hint in similar cases.

Chloroform apparently proves fatal in two different ways, in some cases the respiration ceasing first, in others the pulse. It is only in the first class, where the heart's action continues, that artificial respiration can be expected to succeed. In a case published by Dr. Snow of death from Amylene, it was tried ineffectually after the pulse was imperceptible, the attempt having been made not from hope of success, but because there was nothing else to be done.

No. 2.

Death from Lightning.—By Assistant Surgeon Nuttall, 18th Regiment N. I.

March 17th, 1858.—I was called in the middle of a thunder-storm to the hospital of the 18th Regiment N. I., shortly after 4 P. M., where I was shown

the body of a native, with a peculiar smell of fire about it. The body was that of a man in the prime of life, and its only clothing was a "dhotur," with which the lower part of the trunk was girt. There was no distortion of the features, with the exception of a very slight frown; the eyes were closed, the pupils dilated, and the lips open; the limbs were flaccid, and the body was cold, though not more than a quarter of an hour had elapsed since death. There were traces of an emission, apparently seminal. The hair of the back of the head, on the left side, was singed; the cuticle on the left side of back of trunk, from the top of shoulder to buttock, was stripped off, and so also was the integument on the back of the calf of right leg,—the exposed cutis having here and there a scorched appearance. The hair on the inside of both legs was singed, and a very small hole was burnt in the dhotur, where it covered the nates on the left side, the electric fluid having seemingly passed between it and the skin. No *post-mortem* examination could be obtained.

This man was standing (naked, all except his dhotur) beside a post that supported the roof of his hut, and which post rose higher than any of its neighbours. The bolt entered in the immediate neighbourhood of this post, forcing a hole through the roof, and making its way into the ground at the foot of its victim: at least the earth there bore traces of having been very recently disturbed in a strange manner. Two other men, who were with deceased in the hut, were knocked down at the same time, and stunned; all they knew about the matter being that a dazzling light suddenly shone round about them, accompanied by a loud report, and followed by their own insensibility, which could not, however, in either case, have lasted above two or three minutes. On coming to themselves, they found their comrade lying near them, dead.

No. 3.

Case of Vegetable Poisoning.—By Assistant Surgeon F. Broughton, Civil Surgeon, Kholapore.

The subject of vegetable poisons, and the symptoms produced by them, have recently engaged much of the attention of our profession, and the following case is submitted as a contribution to our recorded knowledge. In this instance the dose, the time of operation, &c. are matters correctly ascertained, and may, in consequence, deserve some attention.

The kunaree *(nerium odorum)* or oleander is well known and extensively resorted to in this part of India as a poison, the expressed juice from the red variety being considered the strongest and most fatal.

Large doses are so generally followed by death that this is the first occasion in which I have been able to mark the effects of a known quantity.

Kardaree bin Dewba, a woodcutter, aged 35, of slight and delicate appearance, was brought to the Civil Hospital at Kholapore on the morning of the 9th of August 1858 in a state of insensibility. It appeared from the evidence of his wife, who accompanied him, that a quarrel had arisen between them in reference to the *res angusta domi*, and that he had swallowed a cupful of kunaree.

From subsequent investigation, it was ascertained that the cup contained a little more than an ounce of expressed juice of oleander, and that at the time of drinking the poison he was standing five yards from his door, towards which he walked immediately, and fell senseless at the threshold.

On admission, his face and eyes were flushed, head hot and perspiring, with stertorous breathing, and foaming at the mouth. This was accompanied by violent spasmodic contractions of the muscles of the entire body, but more remarkable in the superior than inferior extremities, and also more developed on the left than the right side.

The effect of this was remarkable, and new to me as a posture of disease.

During the intervals of spasm, the patient lay evenly upon his back, and when action commenced, the superior contraction of the left side threw him over on his right, in which position he remained during the paroxysm, after the subsidence of which he fell back into the natural posture of exhaustion. Emetics of antimony having failed, sulphate of zinc produced the ejection of large quantities of greenish matter. Insensibility remaining, with quick pulse and hot skin, leeches were applied to the temples, and sulphate of magnesia given as an aperient.

The bowels were moved, although involuntarily, and the evacuations were watery, greenish in colour, containing but little fæculent matter. The spasms returned at intervals of an hour, and were apparently produced by any attempts to move or rouse him.

Towards evening the spasms decreased, the face became pale, the pulse sank to a thread, the eyes shrunk into their sockets, and the extremities rapidly became cold.

Frictions, mustard poultices, with hot bottles, ammonia and camphor restored the circulation, but insensibility continued, and the bowels were moved involuntarily. In this condition he remained the whole of the next day; the spasms were less violent and diminished in frequency. He swallowed the ammonia, camphor, and magnesia, which was continued, but the urine and the evacuations still passed involuntarily.

In the evening of the 10th, reaction was established, the skin became hot, and the pulse increased; there were no spasms, but insensibility remained as complete as before.

A full dose of castor oil was given, and the bowels acted freely, after which he seemed to be in quiet sleep.

He awoke on the morning of the 11th, restored to speech and reason. Weakness only remained as the natural consequence of so violent a seizure.

He has since entirely recovered, and is not, I fear, particularly grateful for his recovery, as he anticipates a recurrence of domestic trouble. He assures me, however, that he recollects nothing from the moment he swallowed the draught, and could form no opinion of the time which elapsed since the suicidal attempt and his recovery.

There can be little doubt that death would have resulted in this instance had treatment not been resorted to both in the first instance, and afterwards in the state of collapse.

The perusal of this case may, perhaps, suggest the possibility of others of a similar description being complicated with judicial investigation. If, for instance, this man had received a wound on the head or spine in the quarrel with his wife, and the fact of swallowing the kunaree had not been elicited, how difficult would have been the diagnosis.

It may be that, in this case, the rapidity and peculiarity of the action of the poison was idiosyncratic to the individual. I should be glad if any member of the Society would oblige me with the result of his experience upon the same; when, if any discrepancy was found to exist, it might be worth while to institute a series of experiments upon the action of the oleander, and I am ready to conduct the enquiry should the Society consider it to be desirable.

No. 4.

A case of Aneurism of the Aorta, followed by Lobular Pneumonia, &c.—By Assistant Surgeon J. T. Mackenzie.

J. F., aged 35 years, eight years' service in India, was admitted into the Staff Hospital at Mhow on the 26th September 1858, suffering from pain in his chest, slight cough, accompanied with thin expectoration; had been a temperate man, and there was no history of syphilis; was in Hospital in August last, suffering from fever. For months past he had complained of sharp lancinating pain in the chest, particularly after using any great exertion. During the late campaign had served near Jhansi, from which place he had been sent down to Mhow, very much emaciated. He remained in hospital until the 29th October, when he was suddenly seized with hemiplegia of the right side; the patient had not complained of any pain in his head or other symptoms previous to the onset of the paralysis, which came on while he was sitting up. This patient first came under my observation on the morning of the 2nd November; he died the same day.

Post-mortem appearances 6 hours after death.—Body presented appearance of belonging to a rather delicate man, emaciation far advanced. *Head.*—On removing the calvarium, and opening the membranes, about the usual quantity of subarachnoid fluid escaped; the membranes on the convex surface of the

brain were healthy ; the whole brain appeared softer than natural. On slicing it, the left hemisphere was much softer than the right, and its *centrum ovale minus* presented innumerable "puncta vasculosa;" there was no fluid in the ventricle. On cutting into the *corpus striatum*, it was found much softened, its inferior portion and the parts corresponding to the *Island of Reil* in the *Fissure of Sylvius* was one mass of diffluent brain matter, and it appeared to have pus mixed with it. There was no lymph or other appearance of inflammation on the membranes at the base of the brain corresponding to the foregoing diseased parts. The right hemisphere and remaining parts of the brain were healthy. *Thorax.*—Recent adhesion between the costal and pulmonary pleuræ of the right side, and also old adhesions on the left side ; there were also signs of recent inflammation of the pleura covering the pericardium on the right side. The pericardium contained about 4 oz. of yellowish-coloured serosity. A tumor about the size of a man's fist was present at the upper part of the anterior mediastinum, and on removing the heart and lungs and great vessels "en masse" this tumor was found to be a sacculated aneurism of the transverse part of the arch of the aorta, involving the great vessels of the head and upper extremity. On careful dissection, the outer of the larger of the walls of the aneurism appeared to be formed by the external coat of the aorta, and the inner layers by fibrine partially organised. The cavity of the aneurism was filled with coagulated blood. After carefully examining the tumor, I do not think that it excited any pressure on the right bronchus, or the vessels going off from the arch, particularly the carotid, which I examined with care ; the interior of these vessels at their commencement were patent. The coats of the abdominal aorta presented atheromatous deposit in its whole length. The pneumogastric and recurrent-laryngeal nerves had been much pressed upon and flattened out. The heart was about the normal size. On opening its cavities, the auriculo-ventricular and semilunar valves were found perfectly healthy. *Lungs.*—The left was healthy, all parts of it floated in water, no tubercles. *Right Lung.*—In the upper lobe grey hepatization with pus at points diffused throughout its tissue. The lower lobes were in a state of red hepatization, and in the form of tubular inflammation, such as is seen produced by purulent infection. The tubes were filled with frothy mucus, mixed with pus. *Abdomen.*—Liver above the normal size and weight, hepatic congestion throughout its structure, and at points throughout its tissue collections of pus were present, each about the size of a grain of duck-shot; these little collections of pus were each surrounded by dark congested portions (inflammatory congestion). *Spleen.*—Rather below the normal size ; in other respects healthy. *Kidneys.*—Also healthy, but smaller than usual. *Intestines.*—Healthy ; colon healthy ; solitary glands conspicuous, but no ulcer or cicatrix. There were no appearances of aneurism in other arteries,—iliacs, femorals, popliteals, subclavians, &c. The vessels

at the base of the brain did not present atheromatous deposit in their structure.

Remarks.—This case presents many points of interest from the mode of invasion which characterized the symptoms, their progress and termination. I will proceed to mention each in detail, commencing with the *Chest.* The patient was admitted with chest symptoms 35 days previous to his death, and those symptoms at no time during their progress appeared to be active, or to occasion alarm. Yet after death we find disease advanced to a considerable extent, and distinctly of that character produced by pyemia, viz. lobular inflammation. Could those appearances, found after death, have been in progress for 35 days, or did they commence at some later period? Or, in other words, were the symptoms in the first place, on admission, idiopathic or catarrhal, or were they the result of morbid material in the circulation, *i. e.* small portions of fibrine detached from the interior of the aneurism, which being stopped in the minute capillaries of the lungs formed the centre for the lobular pneumonia which was seen after death? This question I will not pretend to decide, but I may remark that general experience would tend to show that the symptoms in cases of lobular pneumonia following wounds and amputations (say for scrofulous joints in debilitated subjects in civil Hospitals) run their course more rapidly than exhibited in this case under consideration. On removing the heart and lungs together, I carefully examined the tumor, to see if it excited any pressure on the left bronchus and surrounding parts, but it did not in the slightest degree. The pneumogastric and recurrent-laryngeal nerves were flattened out, and much pressed upon. Yet the man was not affected with laryngeal symptoms, as sometimes seen in aneurisms of this region, particularly when they have advanced to any great size. Might the question of inflammation in parts, supplied by irritated nerves, be applied to the condition of the lung in this case? I merely mention it in connection with some modern remarks on this point.

Abdomen; Liver.—The collection of pus and surrounding inflammatory congestions would tend to show that here the disease depended on the common cause, producing the same morbid results as in the lungs.

Head.—Extensive disease present, though the symptoms of head affections only presented themselves a few days before death, but from their extent, as detailed in the post-mortem examination, they must have been some days in progress. From the appearance of the parts one might suppose that here the same cause produced the same results as in the lungs and liver, viz. a portion of the fibrine gets into the circulation, is carried to the branches of the middle central artery, is then stopped, and forms the nidus of purulent inflammation. The general history of the case would tend to show this. The appearances are not those of white softening from deficient supply of good blood, or from a sufficient supply of bad blood; no pressure was excited on the commencement of the carotid of the left side: no large plug of the fibrine

had prevented the proper circulation in the large vessels, for on this point I made the most careful examination, dissecting out, and slitting open, the coats of the vessels. There was no appearance of a clot of blood from rupture of a vessel, and no signs of membranous inflammation (idiopathic), nor did the man complain of pain in his head or other symptoms previous to the hemiplegic seizure, which was sudden, and not gradual in its onset.

The aneurism itself is worthy of interest as presenting a specimen where nature is endeavouring to promote a cure: the layers of fibrine are in part well organised, but on examining the coats of the aorta further down, all along its course most extensive deposits of atheroma are present. Hence though nature had secured herself against a sudden bursting of the aneurism, yet, as degeneration progressed, sudden rupture might take place at any point of the column of blood. This case would further tend to show that a man suffering from aneurism is at any moment liable to have a small portion of the fibrine contained in the sac of the aneurism detached, carried into the circulation, propelled with the blood into the most minute capillaries (say for instance those of the brain or lungs), and there detained, forming the source from which inflammation, and that of the most uncontrollable nature, will ensue, which is almost certain to result in the death of the patient. This may not be a common form of the termination in cases of aneurism, but it is, nevertheless, a very interesting one; and if it had not supervened in this case, our patient might still have been living.

Knowing that cases of this class are exciting a great deal of interest among Pathologists in Britain, I have been encouraged to bring this case to notice (although it is most imperfect in many particulars). I might remark that Dr. Kirkes, of University College, London, was one of the first who brought this class of cases before the profession, and who pointed out their true explanation.

No. 5.

Instruments used in Bombay to procure Abortion.—By H. J. Carter, Esq., Surgeon to the Coroner, Bombay.

Although the fact of producing abortion in Bombay by the introduction of instruments into the uterus is well known, yet it is only now and then that they are found in such situations and under such circumstances as to lead to their discovery; hence it seems desirable that when such cases do occur, the medical testimony respecting them should be recorded, and therefore it is hoped that the following depositions, which are given as they were taken down by the Coroner, will be found acceptable:—

Case 1.—*December 11th*, 1857. " * * * * I have examined the body of the deceased male infant before the Jury; it appears to have arrived at the full

period of seven months' gestation, and is fourteen inches and a half long. The placenta and umbilical cord are attached, and the latter entire. There are no marks of violence externally about the infant, and it appears to have been born within the last twenty-four hours. I have examined the body internally, and find the organs of the abdomen and chest healthy and natural, part of the meconium appears to have been discharged, and the stomach contained a little glairy fluid. There are signs present in the lungs of the child having breathed, but not freely. I also examined the head, and found the left frontal bone broken in two, with the brain in a pulpy state and partly extravasated under the scalp. I am unable to say if these injuries occurred during lifetime, but if they did, they were in all probability the cause of the child's death, unless the child died of its tender age. I therefore am unable to state what was the cause of death.

"I have also examined Cassee, the reputed mother of the infant; she bears all the signs of having been recently confined. On examining the vagina, I found a stick in it, six inches long and $\frac{1}{8}$ inch broad, which projected into the womb; it consisted of a piece of bamboo, and was armed at one end with a dossil of cotton. I cannot conceive the object of this stick being in such a position, unless it got there by accident during an attempt to produce abortion; the stick might have been so inserted by Cassee herself without any other person's aid, but being so high up it could not be withdrawn by her alone. I had no conversation with her about it."

Observations.—In this case the piece of bamboo had fallen into such a transfixed position, that it was impossible for a person unacquainted with the relation of the parts to remove it without considerable violence, which, I suppose, with the difficulty of reaching it, was the reason why it was left there.

Case 2.—*January 17th,* 1858. "* * * * * I examined the body of the deceased female infant before the Jury; it has arrived at the seventh month of utero-gestation. The placenta and umbilical cord are attached, and the latter entire. The child has been born within the last forty-eight hours. There are no marks of violence about the body. There are signs present of the child having breathed. The stomach was empty. There was no mark of a ligature round the neck, neither was there any foreign substance in the mouth or throat. I am unable to assign the cause of death."

Observations.—I was not called upon to examine the mother of this infant, as she had been previously admitted into the Midwifery Hospital under Dr. Mead, in whose presence the nurse removed from the vagina a stick about four inches long, bound round throughout with cotton and thread, and coated at one end with read lead. This stick I examined when the case was brought before the Magistrate, and then also saw a bundle containing three or four other sticks of the same kind similarly bound round with cotton, &c., which had been found in the woman's house.

Case 3.—A third instance, I remember, in which I had to give evidence, where the instrument produced with which the abortion was said to have been effected, consisted of a straight piece of a small branch of Oleander, about the size of the piece of bamboo mentioned in the first case, but without any arming of lint, and with one end (on which were stains of blood), just as it had been broken off from the continuation of the branch.

General Observations.—Although there seemed to be no doubt that in the last case the stick was introduced to rupture the membranes, as it was stained with blood over one end and unarmed with cotton, yet there can be no doubt also that the instruments mentioned in the second case were totally unadapted for this purpose, from their shortness and the pliant tip of cotton with which they were terminated; hence the latter appears to be one of the instances to which Dr. Broughton has alluded in the last No. of the "Transactions,"* where abortion is attempted by simply introducing an irritating body into the uterus. In the first case the stick was so stiff, and the arming so slight, that it is difficult to decide which was intended.

No. 6.

Note on Pustular Diseases affecting Camels, &c. in Sind.—By J. W. Winchester, F.R.C.S.

Presented 1858.

When I was doing duty, during 1839, at Tatta, in Lower Sind, I frequently met Mr. Masson, who had been long resident in that Province, and in the neighbouring countries. At this time I was collecting information for a topographical account of Tatta, subsequently published by Government among the collected papers entitled "Sind," and amongst other pieces of information Mr. Masson communicated to me, was one regarding a disease known in "Lus" as the "Photo-Shootur," and which I deemed of sufficient importance to include in my Annual Medical Report in the following words, as extracted from Appendix 7, p. 214 of the Medical and Physical Society's Transactions for 1840:—

"The following facts connected with small-pox, and communicated to me by Mr. Masson, a gentleman well known for his very persevering and highly successful antiquarian researches in Central and Upper Asia, will, I am sure, be interesting.

* Appendix, p. vii.

"In the Province of Lus, along the sea-coast S.W. of Karachi, of which Beila is the capital, and Sonmeeanee the sea-port, the milkers of camels affirm that they have a disease called 'Photo-Shootur.' Small-pox in Lus is designated 'Photo,' so that 'Photo-Shootur' implies the small-pox of the camel, which is an eruption on the udder of that animal, not more violent than, and in its pustule similar to that on the udder of the cow. The camels which are thus affected continue to give milk, which is largely drank by the inhabitants; but both the men and the women who milk them are invariably seized with a pustular disease, similar to that on the camel's udder, on their hands and arms, never extending above the elbows. No one has ever been known to die from this eruption, and the Natives themselves remark that those who have had the 'Photo-Shootur' are uniformly exempt from the small-pox, which is a disease occasionally endemic in the district.

"Inoculation* is known in Lus, the virus being taken from a person laboring with small-pox, and inserted on the wrist of healthy individuals (children), who, if the operation is successful, which is not always the case, are seized with small-pox, not limited to the hand and arm, but general over the body, commonly mild, yet in some cases fatal.

"Although the inhabitants are aware that 'Photo-Shootur' is a preventive against small-pox, they do not inoculate with its virus, in a manner similar to what they do from the small-pox pustule, which frequently brings on a disease believed by these people to be beyond the power of the Native Doctors, in so much so, that the relatives of the sick proceed to the shrine of some favorite saint, there, by propitiatory offerings, to invoke aid in favor of the disease."

Any information in the possession of this Society bearing on the subject of vaccination having been desired by Dr. Baron, President of the Section appointed to inquire into the (then) present state of vaccination by the Provincial Medical and Surgical Association, this account of the disease termed "Photo-Shootur" was transmitted, and a request made to me to institute further inquiries regarding this pustular affection.

In 1841 I wrote at some length to a British officer who was then stationed at Sonmeanee, in the capacity of Assistant Political Agent; but, although that gentleman (Captain Wallace) had compiled a very able account of the province of "Lus," published in Rushton's "Calcutta Directory," he was unable to obtain any facts confirmatory of Mr. Masson's statement to me. I likewise failed to obtain any information regarding such a disease amongst the camel-drivers in Lower Scinde; and I had long forgotten the circumstances, until a few days ago, when I read the following account of a nearly similar pustular disease, with the same prophylactic results to the human frame, existing among cows and sheep in the vicinity of Bushire, and which is as follows:—

* Inoculation is also known in Cabool; there it is generally performed by the "Syuds," who frequently do so two or three times before it takes effect."

Extract of a Letter from WILLIAM BRUCE, *Esquire, Resident at Bushire, dated 26th March* 1813, *communicating the discovery of a disease in Persia, contracted by such as milk the cattle and sheep, and which is preventive of the Small-pox.*

"When I was in Bombay I mentioned to you that the cowpox was well known in Persia by the Eliaats, or wandering tribes; since my return here I have made very particular inquiries on this subject amongst several different tribes, who visit this place in the winter to sell the product of their flocks, such as carpets, rugs, butter, cheese, &c. Their flocks during this time are spread over the low country to graze; every Eliaat that I have spoken to on this head, of at least six or seven different tribes, has uniformly told me that the people who are employed to milk the cattle caught a disease, which after once having had, they were perfectly safe from the small-pox; that this disease was prevalent among the cows, and showed itself particularly on the teats, but it was more prevalent and more frequently caught from the sheep. Now this is a circumstance that has never, I believe, before been known, and of the truth of it I have not the smallest doubt, as the persons of whom I inquired could have had no interest in telling me a falsehood; and it is not likely that every one whom I spoke to should agree in deceiving, for I have asked at least forty or fifty persons. To be more sure on the subject, I made most particular inquiries of a very respectable farmer, who lives about fourteen miles from this, by name Mallilla (whom Mr. Babington knows very well), and who is under some obligations to me. This man confirmed everything that the Eliaats had told me; and further said that the disease was very common all over the country, and that his own sheep often had it. There may be one reason for the Eliaats saying that they caught the infection oftener from the sheep than the cow, which is that most of the butter, ghee, cheese, &c. is made from the sheep's milk, and that the black cattle yield very little, being more used for draught than anything else. If you think this information worthy of being communicated to the Society of which I have the honour of being a Member, I beg you will do it in any way you think proper."—*Appendix D. Vol. I. Transactions of the Literary Society of Bombay,* 1819.

When in Scinde, in 1839-40-41, we had very little information regarding the country or its inhabitants, and the natural jealousy fostered by the then rulers precluded much increase to that knowledge. It is now different, and I have presumed to occupy the time of this meeting by bringing to your notice these meagre facts, probably long lost sight of, regarding a supposed pustular disease on the udders of cows, sheep, and camels, in order that further information may be obtained from the officers superintending vaccination in Scinde and Bushire, which might clear up facts, noticed so long ago as 1813 and 1839;—curious in themselves, but which, if established, might tend towards the extension of vaccination amongst the natives of India, especially

among Hindoos, whose religious scruples prevent them accepting an unknown virus, but which might be otherwise, when they have actual proof that it has its origin from cattle, which they do not consider unclean.

No. 7.

Note on cases of Lithotomy in the Civil Hospital, Hyderabad.—By Assistant Surgeon F. S. Stedman, Civil Surgeon.

Presented by the Director General.

The accompanying table* shows that the operation of Lithotomy for removal of calculi was frequently performed from June to December 1858. It was preferred to Lithotrity for the following reasons, viz., the patients were generally from the poorest classes, and would ill submit to the delay and frequent repetition often necessary in the operation of Lithotrity; the calculi were mostly too large or numerous; and some of the cases occurred in children.

The lateral operation, with a limited incision into the prostate gland, was the one employed. In one case only was there any necessity for the division of the right side of the gland, which was accomplished by passing a probe-pointed bistoury along the finger, and making a limited incision. The after-treatment in each case was very simple; small doses of sesquicarbonate of soda in barley water or linseed tea were administered freely. The tube was only employed when any considerable hæmorrhage occurred, which happened in three of the cases, and was generally very readily stopped by the use of the plug, excepting in one case, which proved fatal. It will be seen that fifteen cases were successful, and three fatal, out of eighteen;—average of deaths to treated 1 in 6. Most of the patients operated upon were much deteriorated in health by the lengthened duration of the disease, and the severe suffering caused by it, and from scorbutic and malarious cachexia; but, nevertheless, few were willing or able to permit of delay sufficient to improve their general health. Indeed, in the fatal case from hæmorrhage, the loss of blood would not have been sufficient to account for death, but for the patient being very cachectic from scurvy, and with greatly enlarged spleen. Of the three fatal cases one (No. 18) died from the effects of hæmorrhage, 22 hours after Lithotomy had been performed; another (No. 9), an old and very feeble man, sank seven days after the operation from all the symptoms of urinary infiltration; and the third, a boy (No. 3), from urinary infiltration and

* Page xvi.

general peritonitis. Secondary hæmorrhage occurred in one case on the 12th day, but stopped of itself. The operations in which eighteen calculi were extracted, each calculus had to be hooked down from above the pubis before it could be removed: they were all impacted together around a nucleus. There were two cases of urethral calculi, one a little posterior to the glans penis, the other about midway. On carrying the staff into the bladder, the latter was found to have a stone there also; the incision, which had been made as low down as possible, was carried on, and the lateral operation performed.

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*Other Surgical Operations performed at the Civil Hospital, Hyderabad.**

1. 17*th September* 1858.—Bayee, Mussulman, female, aged 60, in consequence of a severe wound in the left arm by a sword, had flap amputation of the arm at the shoulder joint performed. The patient recovered from the shock of the operation, the wound was commencing to heal, but she died on the 8th day from exhaustion.

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2. 18*th September* 1858.—Begum, Mussulman, female, aged 17, had division of the ulna, and partial division of the radius, from a sword-cut, the lower part of the ulna was removed at the wrist, and the broken extremity above cut off, and a good stump resulted.

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3. 14*th March* 1858.—Hajee, Mussulman, aged 32, had amputation below the knee performed in consequence of old-standing disease of the foot; the patient recovered, and was discharged on the 26th June 1858.

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4. 6*th April* 1858.—Japa, Mussulman, male, aged 32, ascites. Paracentesis abdominis performed. Twenty-nine (29) quarts of clear serum drawn off. The patient survived the operation, but died on the 2nd day.

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5. 6*th June* 1858.—Ahmed, Mussulman, male, aged 38, amputation below the knee, for caries of the foot; constitution broken by long suffering, and cachectic from scurvy and fever. On admission little or nothing could be learnt of his history, excepting that some three years before a painful swelling appeared on the dorsal surface of the foot, which after a short time burst, and was followed by a profuse discharge; that it had given him such extreme pain that he could not get any rest, and he could bear it no longer, and latterly he

* The first four operations were performed by Assistant Surgeon Partridge, the three last by Mr. Stedman.

Table of cases of Lithotomy in the Civil Hospital, Hyderabad, from June to December 1858.

No.	Names.	Age.	Caste.	Sex.	Occupation.	Duration of Disease.	Admission.	Operation.	Result.	Discharge or died.	No. of Calculi.	Composition of Calculi.	Weight.	Remarks.
		Years.				Years.							oz. dr. gr.	
1	Dheruj	14	Hindoo	Male	Banian ..	14	4th June.	7th June	Recovery..	18th July.	8	Phosphate of Lime.	1 1 35	
2	Jussoo	30	,,	,,	Laborer ..	9	,, ,,	8th ,,	,,	6th ,,	3 or 4	,,	0 6 49	
3	Sullaman ..	8	Mussulman..	,,	,,	2	9th ,,	10th ,,	Died	17th June	1	,,	1 0 5	
4	Gan.....	38	Hindoo	,,	Banian ..	9	19th ,,	20th ,,	Recovery..	24th July.	1	,,	0 5 7	
5	Hajianee ..	75	Mussulman..	Female ..	Fukeer ..	3	27th ,,	5th July.	,,	16th ,,	1	,,	0 3 0	
6	Buchal	32	,,	Male	Carpenter.	9	4th July.	,, ,,	,,	27th ,,	1	,,	1 0 45	
7	Fajoob	45	,,	,,	Koomar ..	11	28th ,,	29th ,,	,,	25th Aug.	1	,,	0 4 24	
8	Auchur	7	,,	,,	Laborer ..	1½	14th Aug.	15th Aug.	,,	30th ,,	1	,,	0 2 17	
9	Oil	65	Hindoo	,,	Banian ..	13	17th ,,	18th ,,	Died	23rd ,,	1	,,	2 0 0	
10	Allaruckia ..	35	Mussulman..	,,	Painter ..	9	21st ,,	24th ,,	Recovery..	18th Sept.	1	,,	1 0 45	
11	Yroo	18	,,	,,	Laborer ..	4	24th ,,	,, ,,	,,	17th ,,	1	,,	0 7 0	Stone rough and nodulated.
12	Muckan	80	,,	,,	,,	9	4th Sept.	9th Sept.	,,	21st ,,	1	,,	0 2 39	
13	Khamesa ..	8	,,	,,	,,	4	8th ,,	,, ,,	,,	,, ,,	1	,,	1 2 0	
14	Dajub	13	Hindoo ...	,,	Banian ..	4	23rd ,,	28th ,,	,,	23rd Oct.	1	,,	1 0 20	
15	Sullar	35	Mussulman..	,,	Laborer ..	8	15th Oct.	16th Oct.	,,	21st Nov.	2	,,	0 1 50	Stone in urethra 32 gr.
16	Sadick	22	,,	,,	,,	11	24th ,,	25th ,,	,,	7th Dec.	3	,,	10 4 0	
17	Buckhell....	35	,,	,,	,,	9	11th Nov.	12th ,,	Died	14th ,,	2	,,	1 5 0	
18	Jam.....	48	,,	,,	,,	4	18th Dec.	20th ,,	Recovery..	31st ,,	1	,,	....	

had become greatly emaciated and weak. On examining the part, the whole foot and ankle were found much swollen and indurated, being three times their natural size; on the dorsal surface there were six fistulous openings, discharging pus and curdy matter. The orifices of these were small and round, with everted edges, the canal small, perpendicular to the surface, and leading to exposed bone. This appeared to be clearly a case for amputation, but it was desirable first to improve his general health, for which purpose rest was strictly enforced. Nourishing diet and tonics, with opiates to relieve pain, were administered, and large flour and linseed poultices applied. Under this course of treatment he improved for a time, but hectic with diarrhœa set in, and the removal of the limb became necessary to preserve life. This was done by the flap operation; the only thing to mention about it was that in the middle of the operation, while under the influence of chloroform, both the pulse and respiration suddenly became suspended; water dashed over the face and breast, regulated pressure of thorax and abdomen, and ammonia to the nostrils, gradually brought him to his senses, but he remained in a low state for three days after, and doubtless this tended to the fatal result. The stump at first did well, and the greater part had healed by the first intention, but after the first week diarrhœa returned, and the stump commenced sloughing, and the united parts separated. He became gradually weaker and weaker, and sank one month after the amputation.

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6. 10*th July* 1858.—Rackhell, Mussulman, aged 30, carpenter. The forefinger and head of metacarpal bone of left hand removed on account of extensive injury.

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7. 9*th August* 1858.—Kurmoo, Hindoo, male, aged 55, admitted stating that he had suffered 17 years from an ulcer just above the ankle, which had commenced as a small pustule, and for the last year had caused him excessive pain, especially at night. He had come 80 miles, hoping that I would remove his leg. His general constitution was moderate, and he was rather corpulent. On examining the part, a large and deeply excavated ulcer was seen a little above and to the inner side of right ankle, the surrounding part extending to the foot and ankle extensively enlarged and indurated, some parts of the limb being œdematous; it was circular in shape, and about 6 inches in diameter, its edges raised and everted, and its floor covered by a dark slough. He was put on a liberal diet, not allowed to move, and tonics with opiate administered to relieve pain; strong nitric acid applied freely over the surface of the ulcer, followed by linseed poultices. On the 4th day, the eschar came away, but sloughing continued, and it was considered advisable to amputate, as little benefit was likely to accrue from delay. On the 5th day after admission this was performed, by the flap amputation; two-thirds of the stump healed by the first intention, and he was discharged with a good stump on the 21st September 1858.

No. 8.

Note on Leeches in Western India.—By H. J. Carter, Esq., Surgeon.

Through the kindness of my friend Dr. Buist, I have been favoured with some of the leeches from Matharan, the sanitary hill-station between Bombay and Khandalla on the Ghāts; and on seeking for an account of them as well as of the medicinal leech of this part of India, I find so little recorded of either, that the following descriptions of both may not prove unacceptable.

The Leech of Matharan, which is terrestrial, is about three-quarters of an inch long when at rest, of a light reddish-brown color, with a continuous black line down the middle of the back, and black punctiform spots irregularly scattered over the back and belly; a whitish line of punctiform spots divides the dorsal from the ventral surface, and the head is provided with ten eyes, which are arranged as follows:—six in front of the first segment, in a semi-circle; two upon the first segment, situated laterally; and the other two upon the fourth segment, also situated laterally. The margin of the lip even, but projecting a little anteriorly on the median line.

This appears to be *Hirudo Zeylanica*, but the only description to which I have access is that published by MM. P. Gervais and P. van Beneden in their "Zoologie Médicale"*; and this is so meagre that for the purpose of identification it is useless. It is as follows:—

"*Hirudo Zeylanica*, Knox, 1693.—Back blackish; borders of the same color.

"From the island of Ceylon, where it is found on the grass, in damp woods and everywhere during the rains. It creeps up the legs of travellers with naked feet and bites them with avidity."

And in a "foot-note" to this they add, quoting from Dr. Hoffmeister's "Voyage to India":— "The same observer [viz. Dr. H.] speaks of millions of these little animals which cover the clothes, and penetrating through the smallest holes torment travellers in a most fearful way," in Ceylon. They have also been seen in the Phillipine Islands and Madagascar, and Dr. Gay mentions one of analogous habits in Chili.

Whether all these are of the same species, the future must determine. It is probable that the one of Ceylon is identical with the leech of Matharan, but without a more minute description than that above given the identification is impossible.

The accounts given of the leech of Matharan, by those who have witnessed it in the jungles of Western India,—for it is by no means peculiar to Matharan,—accord closely with those given of the species in Ceylon. Thus it is

* P. 175.—Paris, 1859.

said to form a considerable obstacle to those who may have to pass through the tracts infested with them during the rains; not only weakening them by loss of blood, but occasionally leaving bites which inflame and ulcerate. The activity of these leeches is beyond conception, for although, leech-like, they have to bring their tail close to their head before they can move a step, yet they do this with such nimbleness, and are so ready to attack the finger that is placed upon them to arrest their progress, at the same time, that it becomes a puzzle to put one in a test-tube, and a source of amusement to see a person trying to get half-a-dozen into a wide-mouthed bottle. Hence they would be very difficult to manipulate medically; still, on an emergency there seems no objection to their being used, for although their bites may occasionally become irritable and suppurate, yet this occurs with the medicinal leech, and probably depends more frequently upon the state of the constitution of the patient than the leech.

What becomes of them during the dry weather has not been ascertained. They may dry up like some of the Naidina and microscopic Filaridæ, and also like them only come into active existence and breed during the rains, passing all the rest of their life in a kind of mimic death; or, like the "Annuals" of the vegetable kingdom, leave some vital remnants of their species wrapt in seed-like cases, or ova, to be developed another year.

On the other hand, the Medicinal Leech of Western India is lacustrine, from two to three inches long in a state of rest after having been used, but less previously. It is uniformly granulated or studded with minute papillæ all over the surface; of a dark olive-green on the back, and a lighter one on the belly; with seven regularly interrupted lines running down the back, of which the central one is more continuous than the rest; no spots on the belly; a yellow line divides the dorsal from the ventral surface; and the head is provided with twelve eyes, which are arranged as follows:—two in front of the first segment, median, approximated and transverse; four on the first segment, two of which are immediately behind and in a line with the foregoing, and the other two situated laterally; two on the second segment, laterally; two on the fourth segment, laterally; and the other two on the seventh segment, laterally. The margin of the lip is uneven, and slightly notched on the median line in front.

This leech, from its striking feature, viz. the granular surface, would appear to be *Hirudo granulosa*, but here again the description in the work mentioned is so meagre that for identification it also is useless. It is as follows:—

"*Hirudo Granulosa*, Savigny.—Back of a green-brown color, with three obscure bands.

"Inhabits India. Is employed by the medical men of Pondicherry.

"This leech is larger than the European medicinal one; it frequently gives rise to hæmorrhages, which excite anxiety, but seldom become serious."

Thus, whether the Pondicherry leech be different from the medicinal leech of Western India or not, the latter is smaller than the *Hirudo medicinalis* of Europe; it also has twelve eyes, whereas the latter has only ten; and on comparing diagrams of the two, the additional two eyes will be found to be on the first segment of the leech of Western India, otherwise, the rest of the eyes are situated exactly at the same intervals of distance from each other, that is, on the same segments. It further differs from *Hirudo medicinalis* in having seven instead of six lines on the back, and in the lip being slightly notched on the margin in front instead of pointed.

For further accounts of this leech, and the manner of breeding it, see these "Transactions" No. 8, p. 93, &c. 1847; and for those who would pursue the subject still further, I would recommend the work of M. Moquin-Tandon* as likely to afford the most assistance. But the position and number of the eyes should always be noted as well as the colour-markings, and general form of the body, together with the kind of blood in the veins, viz. whether red or colourless.

No. 9.

Medico-legal Case and Opinion.—By Assistant Surgeon G. E. Seward, M.D., Native Veteran Battalion.

Presented by the Medical Board.

Substance of a Mahratta Letter of Vittooba Succoojee Niggoodkur, Foujdar of Sooba Pettah Hurnee, Talooka Sooverndoorg. To the address of the Medical Officer at Dapoolee, dated 14*th June* 1857.

"The Police Carbaree of Moujay Seersodee, Turff Palwan, was sleeping in his own house on the 10th June 1857. His two sons were lying by him. On a sudden he cried out loudly: he felt that two blows had been struck on his abdomen. From that time his abdomen swelled, and became painful. He could no longer defæcate. He died on the next morning.

"The people believe his death to have arisen from a natural cause; this, however, being very doubtful, I have caused the body to be sent for your inspection."

It was further gathered from the attendants that a light was burning in the room; that the doors were closed; that the deceased was strongly impressed with the idea that a man had inflicted these two blows; that he was greatly alarmed; that he afterwards vomited water, then blood.

* *Monographie de la Famille des Hirudinées.* 2nd Ed. Paris, 1846; 1 vol. 8vo. avec Atlas de 14 planches colorées.

The main incidents in this history seemed to point clearly to a rupture of some abdominal viscus; the autopsy was undertaken in full anticipation of lighting upon some "solution of continunity."

The body was brought for examination on the 5th morning after death—vocant with flies—swollen and bloated with the gases of advaneed decomposition.

On cutting the abdominal parieties the intestines protruding with great force altered the position of the viseera. Maggots swarmed in the peritoneal sac. The liver appeared to be unusually small, spleen like in eolor, soft, and easily lacerable. The spleen flattened and expanded. The stages of decomposition, going on hand in hand with great compression to which these viscera were subjected by the accumulating gases, might have had much to do with the apparent smallness of the liver. Fæees, semifluid, were found in the pelvie eavity inside the sac of the peritonæum. No blood was evident. The stomach greatly dilated. Its inner coat mammilated, or thrown up here and there in nipple-shaped eminences. These eminences were deemed results of decomposition, their contents gas, ripping the mueous coat from its attached surface. On cutting them open they were found to be empty, nor did they collapse. The areolar submueous tissue in one ease appeared to be thickened, existing as a glistening circular band or bundle. If these were so, post-mortem change would fail to account for this stage. About eight inches from the duodenum found the jejunum, completely rent asunder. Carefully removing that portion of the bowel contiguous with the torn part, the following description was at once recorded:—

1*st*.—The peritoneal coat of the portions of bowel, to the extent of about five inches above and below the rupture, is covered with patches of lymph, easily separable in flakes. No lymph is observed on the mesentery. The general surface is pale, mottled, or striped with dark red in the course of the veins (which are gorged with black blood); red, of a lighter hue, coloring the mesenteric border. At the point of disunion, the mesentery is torn to the extent of a quarter of an inch.

2*nd*.—This portion has evidently been the seat of acute disease, as shown by its deep blackish-red aspect. The rent, possibly the result of peristaltic motion prior to death, or more probably effected by rough handling of corpse during its carriage, or during forcible protrusion of bowel-contents (by compressed gases) on opening the abdomen.

3*rd*.—On one side of the rent, redness extends an inch from the line of lesion, and merges suddenly into a deep blackish spot. The serous membrane is irregularly torn and retracted from the edge of the rent. The muscular tissue is dark and thickened for one-third of an inch across the bowel at this edge of the tear; and thence a red line extends around the gut at extreme limit of ruptured serous coat. The serous coat of the second portion is also irregularly torn and retracted. Corresponding to the black spot already

noticed is a small, round, shallow, concave depression (an ulcer apparently ?), and seemingly situate on the subserous tissue. In a line with this, on the circumference and towards the free edge of tube, a hole in base of a small triangular flap of serous coat, which would be applied to the side of a tongue of the same coat on the other half. Next again to this, a thickened dark spot in middle coat ; and to this, the submucous tissue, if not the mucous coat of a valvula conniventis, is adherent. Its size is that of a dhall grain. The mucous membrane appears to be unaffected. The valvulæ conniventes of the duodenal portion are stained with yellow bile. The other detached portion of tube is perfectly free from stain, and of the usual color. The contents of the upper part have escaped into the abdomen, the remainder consist of soft fæcal matter of deep brown color, with altered particles of dhall and ooreed ; the lower contains grey chyle.

4*th*.—The retraction of the serous membrane, the thickened everted edges of the rent, exclusive of the thickening, the result of disease, would indicate that the rupture happened during life, or certainly before the tissues had lost their contractility.

Medical Opinion.

I yesterday (June the 15th), on the 5th morning after death, examined the body reported to be that of Police Carbaree Ramjee Morey, of Moujay Seersodee Turff Palwan, and found that the intestinal tube near the stomach was divided and broken asunder. At the place of rupture disease had existed and did exist at the time when deceased was taken ill, sufficient to permit of the tearing asunder of the bowel by its own action. I am of opinion that death was brought about by a natural cause, namely, the breaking asunder of the bowel, weakened by disease.

No. 10.

Case of Partial Amputation of the Foot (Chopart's Operation).—By Assistant Surgeon A. M. Rogers, Poona Horse.

Presented by the Medical Board.

Limbaa, a Hindoo, of the maang caste, about 35 years of age, a rope-maker by trade, living at a village called Neervee, about 12 miles from Seroor, states, that about ten years ago he first observed a small swelling situated

between the roots of the great and second toe of the right foot; it gradually extended up the dorsum, and, passing between the toes, to the sole of the foot. After the third year of its age, the cutiele covering it gave way in one or two places, and finding it continue to increase in size, he became rather anxious, and allowed a native quaek to cut into it, and apply some ointment; no benefit resulted from this treatment, but rather the contrary, as he states that he felt no pain in the growth until after the above mentioned operation had been performed; the pain then eommenced, and was of a shooting character, aggravated at night, and there was a slight, watery, odorless discharge from the wound. The man states that his parents were both healthy, and never suffered from any cutaneous or other disease, &c., and lived to an advaneed period; his brothers are healthy, strong men, and his children, five in number, are remarkably healthy. The people in the village are not subject to any peculiar epidemic disease, but he states that there is one man who is suffering from a tumour of considerable size on the calf of the leg, precisely similar—as to origin, rapidity of growth, pain, and character of discharge—to that with which he is afflicted; the man referred to is advaneed in years, or he would be glad to have it removed, he says, by an operation. During the hot season, the supply of water in the village is scanty, and obtained by digging, for some depth, through a light gravelly soil. The water is said to be very good. In July last the man Limbaa applied to me, requesting, as the pain had considerably increased, and was almost constant, that he might be relieved of it, by having the diseased portion of the foot removed, and with more intelligence than the generality of his class usually exhibit, remarked, that if he could have the heel for a stump to walk upon, he would be very glad. Upon examination, I found the dorsum of the right foot (for the greater part at least) occupied by a morbid growth extending from the ends of the toes, which were all implicated to within about two inches of the instep; the sole of the foot was also occupied by a similar diseased mass, but it had not extended quite so far back as on the dorsum. The growth appeared to me to be an elephantoid tumour,* and presented a number of conical elevations; the cutiele over it was tense, indurated, and in some parts smooth; the apices of some of those cones had given way, and an ichorous, somewhat oily matter, was discharged. So much of the dorsum of the foot was implicated, indeed so much of both surfaces, I saw at once that if I performed Chopart's operation, the flaps must be scanty, just sufficient to cover the stump, still, being desirous of saving as much of the foot as I possibly could, I thought it best to perform that operation, and if driven to it, in consequence of extensive sloughing, scanty flaps, or any other good reason, I had then the dernier resort, of resetting the heel, Mr. Syme's operation, left me.

During my pupilage at King's College, and whilst dresser to Professor

* See Dr. Ballingall's description of a tumour affecting the foot. *Transactions, Vol. II. p.* 273.

Fergusson, I had more than once seen the operation performed, and noticed the opposition which the powerful action of the Tendo Achillis exerted, and the tendency such action had, not only to keep the lower flap as it were constantly on the stretch, but, when the wound was healed, to drag the heel backwards, and upwards, and so to throw all the weight of the body upon the cicatrix. I determined to obviate this, if possible, and, as a preliminary step, to divide the tendon by a subcutaneous incision.

Having explained to the man the nature of the operation I intended to perform, the probable period that would elapse before he could leave the hospital, and the amount of risk he ran, he still urged the wish to have the foot removed. Chloroform was administered by means of a handkerchief, (the simplest and, I believe, the safest mode that can be adopted, and one which I have very frequently practised). The man rapidly came under its influence, and the operation was then performed as follows:—

The patient being placed in a good position, and the circulation partially arrested by a tourniquet applied at the knee, an assistant firmly grasped the foot just by the ankle, and a semilunar incision was carried across the dorsum of the foot as close to the diseased structure as was deemed advisable, this incision divided at once all the structures down to the bones; the flap was then carefully dissected upwards, the fore part of the foot pressed upon, the ligaments put upon the stretch and divided, and the articulations (between the calcaneum and cuboid, and the astragalus and scaphoid bones) easily entered; the knife being kept close to the under surface of the bones. The lower flap was formed by dissecting downwards to within a few lines of the tumour, and then dividing it by an incision similar in shape to the one with which the operation was commenced; the exposed articular surfaces of the astragalus and calcis were then removed by the saw. A very trifling bleeding took place, the arteries were easily ligatured, and the flaps brought together, a few sutures kept them in excellent position, and after 3 or 4 straps, and a properly adjusted bandage had been applied, the man was carried to bed. The division of the Tendo Achillis was very easily effected, and with the loss of only a few drops of blood.

I have only to add that no bad symptom appeared after the operation; two very trifling sinuses formed, but were speedily healed; a new structure completely united the divided ends of the tendon, and the man enjoys a *painless* stump, upon which he attends to his ordinary occupation. The dressing used was of the simplest description, chiefly cold water.

Remarks.—One of the most singular features in the above case is, the wonderfully good health which the man enjoyed during the whole time that he carried about the diseased limb, all his suffering, and until very lately it was quite inconsiderable, was local; no pyrexia, no derangement of the alimentary canal or nervous system was induced by the disease; and when I first saw him he was, apart from the local pain, in excellent health. The tumour

was small, not weighing, I suppose, above six pounds. When cut into, it appeared to consist of dense fibrous tissue, very tough, and giving a sort of grating sensation when cut (such as is experienced when dividing a tendon). It was of a yellow colour, not unlike a cow's udder, and an oily-like fluid escaped from what appeared like the meshes of this fibrous tissue, of which the whole mass seemed to be composed. As I do not possess a microscope, I was unable to examine it minutely, and therefore can only give the appearance which it presented to the unaided eye. The muscular tissues of the foot were not destroyed, but buried, as it were, in the mass, the bloodless character of which was quite remarkable.

No. 11.

Note on Aden Ulcers, compiled from Official Documents.—By the Secretary.

Presented 1857.

The Medical Superintendent of Aden, Surgeon Craig, states that he had seen the very worst form of sea-scurvy before entering the Honorable Company's service in merchant sailors; that he witnessed the disease amongst sepoys at Kurrachee in 1841; that in 1839 he had many opportunities of observing the sloughing ulcers of Aden in Fort George, when the Golundauze were sent back to India; that whilst in the Indian Navy he saw much of the disease; and that when in medical charge of the Marine Battalion he made these diseases his particular study. His remarks, therefore, on the "Aden Sloughing Ulcer" merit considerable attention.

Dr. Craig states that the conviction has been slowly growing in his mind, that the mortality from ulcers amongst the biggaries at Aden was not owing to scurvy, or, if so, only in a comparatively small degree. In support of this opinion, he adduces the following reasons:—

1*st*, the general healthy appearance of the biggaries out of hospital; 2*nd*, the severity of the ulcers being out of all proportion to the other symptoms of scurvy (when existing),—for example, out of 32 cases sent to Bombay by the ship "Carpentaria," there were only 3 men who had any sponginess of the gums; 3*rd*, the good quality of their food. Dr. Craig examined the ulcer cases in the Military Native General Hospital on the 15th December 1856, previous to the embarkation of many of them for Bombay, with great care, and found them not in a satisfactory condition, and two cases, which had been put down for Bombay, were moribund. He was

particularly struck with the damp floors and damp stones of the wards (some rain having fallen about this time): "the entire place," he says, "had a sickly appearance, and the atmosphere is more easily imagined than described." He suspected that *Hospital Gangrene* was the cause of the mortality amongst the biggaries, and he thereupon determined to remove the sick from the hospital, and place them in tents on elevated ground near at hand, sending only the favourable cases on board-ship for passage to Bombay, the very slight cases to their lines, and retaining only the worst, viz. all those in which the ulcers were "sloughing." Eleven cases, therefore, previously destined for Bombay were kept back. He directed the medical subordinate proceeding in charge to Bombay immediately to remove any ulcer case that had a sloughing appearance to some other part of the vessel, and shut off all communication; besides giving particular instructions to attend to cleanliness and ventilation.

If these means did not succeed, he suggested that no ulcer cases should ever be again sent on board sailing vessels to Bombay.*

At the period of Dr. Craig's experiments of retaining the worst cases at Aden, the weather was unfavourable, being cold and damp, with boisterous winds, nevertheless, nine days afterwards no fresh ulcer case had been admitted, the ulcers which had not put on a sloughing appearance were doing well, and of the eleven bad cases retained, the two moribund cases of course died, one in two, the other in five days after; in the latter instance amputation of the foot was performed, but the slough spread, and the whole leg was a mass of gangrene; two of the others were in an unsatisfactory state, but the ulcers in all the others had begun to assume a healthy appearance.

At the end of a month, three cases had died, and one was still in a precarious condition, but Dr. Craig believes that "such instances as these would not be benefited by any removal to India, however rapid": they would terminate in death, unameliorated by any change of climate or of diet. The other cases were all improving. Dr. Craig observing amongst the separated cases one commencing to slough, had the tents struck, and repitched at a short distance, fresh sand put down, hospital cots washed, &c., and every means adopted to insure thorough ventilation and cleanliness. At this date there were 16 cases in tents, 1 gangrenous, 1 sloughing, 7 partially, and 7 entirely clean. The ulcers in some cases involved the whole limb. In the lines there were 18 slight cases, all healthy.

* This was a mere restoration of a previously expressed opinion. On the 4th July 1856, the Acting Surgeon of the Jamsetjee Jejeebhoy Hospital, Dr. Peet, reported that out of 12 men from Aden, admitted on the 17th June, eight had died, seven from sloughing ulcers, and one from diarrhœa. He submitted, whether it was expedient to send men affected with Aden ulcers to Bombay in the monsoon; and stated that they cannot but be exposed to much suffering on the passage. "I am convinced" (he says) "the moist air of Bombay at this season is extremely prejudicial to such cases, and even whether it is not more opposed to the healing of such sores than that of Aden: not one of the ulcers in the cases admitted from Aden showed the slightest appearance of amendment."

Dr. Craig remarks that, not only at that time, but in a previous outbreak, can he find any evidence that patients are admitted into hospital with ulcers in a sloughy state. Sloughing, he says, comes on after the patient has been some time in hospital. In corroboration of this statement, he notices that the wives and children of sepoys and biggaries never suffer from Aden ulcers, and he thinks it fortunate that "no hospital accommodation has ever been found for them."

The following is Dr. Craig's summary of what seems to him the nature and cause of the Aden Ulcer :—

"By the end of the long hot season, to the debilitating influence of which sepoys on duty and biggaries at work are much exposed, from the scanty supply of fresh vegetables, of which, even when procurable, they grudge the expense, and probably somewhat owing to the scanty supply and bad quality of the water, the natives of India become more or less enfeebled, and in many cases tainted with scurvy. Ulcers, therefore, from whatever cause produced, are slow to heal, and gradually accumulate in hospital. It unfortunately happened for the biggaries that the hospital was imperfectly ventilated, and badly situated, immediately on the high-water mark, each receding tide leaving an extensive surface of mud, mixed with much decaying marine animal matter, as formerly pointed out by Dr. Steinhaeuser. The floors of the hospital were damp, sufficient of itself in cold weather to convert healthy ulcers into foul; and, in my opinion, the main cause of the evil. The walls, constructed of matting, acting as a sponge for sucking up putrid and other unhealthy emanations, becoming in the end a focus of infection.* A number of ulcer cases being thus crowded together, is of itself sufficient to keep them from healing, from it being impossible to keep the air pure; any one of them taking on a sloughing action, or from the admission of such one into hospital, like leaven, soon affects the whole mass, so that in the same ward may be found sores of all different degrees of intensity, from the indolent flabby, up to the worst form of gangrenous ulcer. To use a simple comparison, the small spark becomes a fierce flame, a raging furnace, which it is no easy task to extinguish. By stopping, however, the supply of fuel, and, if possible, scattering the embers, the fire, however large, will gradually die out."

To turn, however, to the measures adopted by the Superintendent:—a sort of dispensary practice was resorted to instead of hospital, and patients in the lines attended the hospital every morning for medicines and dressings, as Dr. Craig considered, owing to the difficulty of entirely separating the sloughing from the clean ulcers, that all of the latter should be attended in their own lines; and he thinks if this had been always done, the medical history of Aden for the last seventeen years would have been a less melancholy one than it has been. He says—"It has been my lot on various occasions to see

* Tents would be almost as objectionable, but their walls can be taken down and aired.

disease in its most appalling form, but anything so utterly repulsive as the wretched state exhibited by these unfortunate men on my arrival here, I never witnessed. At first, bewildered and staggered by the conflicting opinions prevalent at the station, the true nature of the disease, or what at least seems to me to be so, slowly dawned on my mind; the patients themselves were panic-stricken; and the letter of the Executive Engineer to the Major of Brigade, evidently written with feelings naturally excited after visiting the hospital, will show the prevailing feeling at the station."

Dr. Craig then makes the following suggestion :—

"As to the employment of coolies from India at Aden, from political motives, it would seem advisable to use the natives of the country in preference to others. The temperature of Aden in the hot season is much higher than that of the Mauritius or West Indies, where the system is said to work well; and from the deficiency of vegetables in the hot season, when most required, scurvy is always to be dreaded. At the same time, I cannot now help thinking that by some attention being paid to their diet, shelter, and comfort, it might be possible to keep the coolies here in tolerable working condition."

With respect to the men who were sent to Bombay in the "Carpentaria," all carefully selected cases, there were 32 biggaries and 28 sepoys; of the latter 22 were simply unfits. One sepoy and one biggary died on the passage, and the remaining 4 cases of sepoys were "scurvy," sent, on arrival, to their own country. 15 cases of ulcers were admitted into the Jamsetjee Jejeebhoy Hospital on the 15th January, and only in one case is it mentioned that the ulcer was worse; all the others were improving.

Of the original 11 detained behind at Aden, two were moribund, and shortly afterwards died; two others after some considerable time; and on the 28th January the 2 remaining cases terminated fatally, making a total of six, whilst on board-ship 2 deaths occurred, and 1 case in the Jamsetjee Jejeebhoy Hospital had become worse. This is a small mortality, however, compared to the average, or to what it might have been had the eleven bad cases been embarked.

Dr. Craig mentions that the usual history of Aden ulcer cases is, for the patient to be admitted with a very small wound or ulcer, abrasion, or a guinea-worm; and out of 27 cases remaining on the 31st January, 15 were from a wound or bruise, 6 from guinea-worm, 5 from abscess or phlegmon, and 1 from a blister.

Having traced the 11 cases left at Aden, it is only necessary to mention that of the remaining separated cases only 1 had sloughing come on, which arose, Dr. Craig observes, from the almost impossibility of cutting off all connection between two classes when kept in tents near each other.

With reference to the treated out of hospital in the lines, Dr. Craig states—"I have never seen ulcer cases in native hospitals heal more

readily, nor (although it may seem exaggeration) so well, confirming the impression long held by me, that ulcer cases, but more especially those of the lower extremities, heal *(cæterus paribus)* more readiy out of hospital than in, and this from causes which are not very difficult to explain. Ulcers, like fungi, luxuriate in the shade, in damp squalid places, where the air is stagnant. Native hospitals are sometimes so situated that ventilation is very imperfect or impossible, in almost all from the height of the windows above the floors, both in the hospital and verandahs; although the air above may be tolerably pure, there is a substratum of impure air below the window-sills, in which the patients are immersed when asleep. With a number of ulcer cases in one long ward, some of which are in a sloughing state, or even gangrenous, how speedily must the air become vitiated below, the only access of fresh air being by the doors. This defect, of course, might easily be avoided, by having the window-sills so low (or the cots so high) that the patients' heads might be an inch or two above them. The same remarks apply to typhus fever, the twin sister and usual companion of hospital gangrene. It would be easy to give examples of this imperfect construction among the hospitals at the Presidency: the Marine Battalion will suffice. On this principle the Executive Engineer informs me, that the various new hospitals and barracks are to be constructed at this station. In some hospitals the form of the building is very objectionable; thus the Belooch Hospital at Hyderabad forms three sides of a square. This could only be made worse by adding the fourth side. When I last served there the men of that regiment used to suffer from an obstinate form of sloughing ulcer, of the cause of which I was then ignorant. Further, when out of hospital, natives spend more time in the open air, and if seated, it is on the ground, if in their huts, with a piece of matting or rug below them; in hospital they sit upon the sides of their cots with their feet hanging down, whereby the circulation becomes impeded, more especially if in cold weather their feet are resting on a cold stone flooring or an earthen one rendered damp by the process of cowdunging. The remedies are very simple, and may be well known; it is only a pity that they are not acted on; were it so, I am sure that the per-centage of sick of the Indian Army would be somewhat reduced."

* * * * "I have lately had an opportunity of reading Dr. Steinhaeuser's report on the Aden or Yemen Ulcer, under which title he well describes the disease so common here among the native poor and destitute. Like the term Beriberi, the use of which Dr. Morehead and others consider objectionable, tending to obscure the nature of the disease, which is simply cachexia or general weakness of the muscular and circulating systems, produced, or at all events accompanied, with a more or less watery or other abnormal state of the blood, whereby the reparative power is weakened or even nullified. I consider the Aden Ulcer to be merely another form of this disease, in other cases manifested by passive dropsies and visceral

obstruction or congestion. The same kind of ulcers exists among the natives in Scinde, and among the poor and destitute in all other Eastern nations. At Aden, and the other places mentioned in the report, the disease is aggravated by the scarcity of vegetables, and probably also by the use of brackish water, inducing a scorbutic taint. (It is remarkable that the Jews at Aden never suffer from this disease, and apparently very little from ulcers of any kind. On lately examining the feet of upwards of twenty, I did not see the marks of even a small ulcer on any of them. The causes of this exemption, in all probability, are that in constitution they are more allied to Europeans, the circulation being more vigorous, and, though many of them are poor, *none* are destitute. The form of the foot in this class is striking, being admirably proportioned, affording a pure specimen of the Caucasian type; and this, also, may have something to do with their exemption from the disease.) I need scarcely say that in my opinion the mortality of the biggaries and of the sepoys, in former years, has not been owing to this form of cachexia, or but to a very small degree; if so, it were unavoidable; but the result of the experiment, and of all the observations I have been able to make, prove to me that by the use of ordinary care, and the precautions indicated as before stated, such mortality may in future be prevented. I would further add, in bringing these (it must be confessed) desultory observations to a close, that whilst it is probable that the natives of India sent to Aden may, and to all probability will, die of scurvy, and occasionally from sloughing ulcers, a recurrence of the lamentable scenes in the biggarie hospital will only be owing to culpable mismanagement."

No. 12.

*Cases of Coup-de-Soleil in the 3rd European Regiment, Central India Field Force.**—By T. W. W. Ward, Esq., Surgeon.

Case No. 1.

1858, *6th May.*—Serjeant M. H., aged 35 years, residence in India 10 years, a thin, spare-looking man, who, since the regiment left Poona, had been in the habit of freely indulging in liquor, admitted into hospital this afternoon at 3 P. M., complaining of slight pain at the epigastrium, and constant inclination to throw up, accompanied with slight oppression in the chest; his breathing was not materially affected, no febrile symptoms, but complains of thirst; tongue dry and slightly furred; bowels rather

* Note.—These cases were not written with a view to publication, but are merely official diaries of fatal cases, transmitted to the Director General, Medical Department, by whom they were presented to the Society.—Secy.

loose, stools watery. ℞ Haust. effervesc. tinct. opii, ♏ x. to be given immediately, and to be repeated. Fomentation to the epigastrium; now he feels a great deal better. ℞ Hydrargy. chlorid. gr. v. Extr. Opii gr. i., mft. pil. to be given at bedtime.

7th May.—Was rather uneasy at 10 o'clock last night from increased pain at the epigastrium, says he has a feeling as if his stomach was dragging away from its place, and nausea; no unusual heat of surface, his pulse was frequent, but moderately strong; had an effervescing draught with tinct. opii ♏ xxx. and fomentation to epigastrium. This relieved him a good deal. This morning he feels much better, no pain, but complains of weakness, tongue dry and slightly furred, pulse frequent and pretty strong, bowels not opened during the night. ℞ Ol. ricini ℥iv., tinct. opii ♏ x., aqua menth. pip. ℥i. to be given immediately. At 12 o'clock in the day the uneasiness at the epigastrium became more severe, as also all over his chest, and he felt a sort of creeping sensation all along his body and running upwards to his head, nausea with great prostration of strength, no febrile symptoms; had 5 grains of sesquicarbonate of ammonia with effervescing draught, repeated fomentations to the epigastrium, mustard poultices to the chest, had sago conjee, wine ℥i. in sago; this he relished, and fell into a sleep; he rose up suddenly at 2 o'clock P. M. with febrile heat of skin, which gradually became stronger and followed with slight delirium, difficulty of breathing, head-ache, and quick pulse, but moderately strong. Leeches were applied to the temples, blisters to the nape of the neck and cardiac region, cold applications to the head; gave hydrarg. chlorid. gr. v., pulv. ant. co. gr. iii. followed with mist. salinæ; half an hour after he vomited a large quantity of fluid; soon after he fell into a state of coma, with contraction of the pupils, quick pulse, the power of deglutition became difficult and respiration hurried, and he gradually began to sink. 5½ P. M. expired. The body was examined the following morning at 5 A. M.

Thorax.—The heart was found larger than natural with a considerable deposit of fat, the muscular structure pale and flabby, increased thinness of the walls of both ventricles, and dilatation of the cavities, valves healthy, with the exception of a slight cartilaginous deposit at the base of the mitral valve.

Lungs.—Extreme congestion of the right lung, and on making a section a considerable quantity of frothy mucous exuded; lungs permeable to air.

Abdomen.—Stomach: congestion of the mucous membrane towards its cardiac end. Time was not allowed to examine the head, but doubtless there would have been found engorgement of the sinuses of the brain.

Case No. 2.

1858, *7th May.*—Private I. M., aged 20 years, residence in India 4 years and 8 days, a stout, short-necked, young recruit was brought into hospital

at 3½ P. M., says that he has been suffering from a slight attack of fever for the last three days ; this morning he has had a return of fever, the skin perspiring and a little above its natural temperature, bowels confined, no head-ache. ℞ Hydrarg. chlorid. gr. iv., ext. colocynth co. gr. viii., ant. pot. tart. gr. ¼ ; mft. pil. to be given at bedtime.

8*th May*.—No fever or head-ache, skin natural, bowels not opened. ℞ Infus. sennæ ℥iii., magnesiæ sulphat. ʒiii. ; mft. mist. to be given immediately.

1 P. M.—Bowels freely moved, says the fever returned at 12½ P. M., without chill, complains of dizziness and severe head-ache, his surface is hot and dry, tongue parched and slightly furred white, pulse quick and strong. ℞ Hydrarg. chlorid. gr. v., pulv. Jacobi gr. iii. mft. pulvis to be given immediately followed by ℞ Liq. ammon acetat. ℥ii., potass. nitras gr. v., mist. camphora ℥i. mft. mist. Apply hirudines xxiv. to the temples.

2½ P. M.—Head shaved, and cold application applied. Appt. Emplast lyttæ to the nape of the neck. He fell into a sudden tremor of the whole body, and became rather speechless, his pupils contracted, pulse quick, respiration hurried, action of the heart tumultuous. Cold douche to the head, emplast lyttæ to the region of the heart. Calomel was repeated.

8*th May*.—The measures failed to rally him : he gradually became worse, and died at 3¾ P. M.

Post-mortem Appearances three hours after Death.—All the organs of the chest and abdomen healthy.

Head.—On removing the calvarium the dura mater was seen to be much congested, all the sinuses of the brain were gorged with blood. There was no lesion of the brain, and no increased vascularity of the pia mater.

Case No. 3.

1858, 11*th May*.—Private P. W., aged 28 years, a strong young man, was on duty at the Fort of Jhansi, admitted into the hospital at 8 o'clock this morning, complaining of being attacked with slight fever for the last two days.

9 A. M.—He is at present quite free from fever, no head-ache, but says he feels slight giddiness when walking, bowels have not been opened for the last 3 days, tongue foul, white. ℞ Magnesiæ sulphas ʒvi., aquæ menthæ. pip. ℥iss., mft. mist. to be given immediately.

1 P. M.—Had been 3 times to stool since he took the draught, slept the greatest part of the forenoon, and expressed himself better; at 12½ P. M. he was suddenly seized with severe giddiness, he laid down on his bed, a few minutes after he became delirious, with hot skin, quick and strong pulse, wild countenance, and making attempts to run out of the tent; his head was immediately shaved, and a cold douche was given, and repeated every five minutes for half an hour. ℞ Hydrarg. chlorid. gr. x., ant. pot. tart. gr. ¼,

mft. pil. to be given immediately. Apply hirudines xxiv. to the temples; at 1 P. M. his pulse gradually fell, and he became comatose; a blister was applied to the nape and head, ammonia carbonas gr. v., with camphor mixture given; mustard sinapisms to the soles and calves. At $1\frac{3}{4}$ reaction came on, the pulse rose to 148, full, jerking. Venesection from the left arm to the extent of 16 oz. The calomel was repeated without antimony, cold application to forehead continued constantly. At $2\frac{1}{2}$ P. M. his breathing became stertorous, countenance changed, pupils insensible to light, intermitting pulse, no power of swallowing; he passed an involuntary stool, and gradually sunk. Died at 3 P. M. No *post-mortem* examination was made.

Case No. 4.

1858, 10*th May*.—Private I. O., aged 25 years, residence in India 5 years. A strong man, but of rather pale complexion, brought into hospital in a dooly from the Fort of Jhansi (where he was on duty) at 9 P. M. in a state of insensibility, with laborious breathing, hot burning surface, and dilated pupils, which were also insensible to light, his pulse was quick and strong; the orderly who accompanied him into the hospital stated that the man was standing outside, when he suddenly fell down senseless. Head shaved, cold douche applied every five minutes for half an hour. Hydrarg. chlorid. gr. x., ant. pot. tart. gr. $\frac{1}{2}$ administered; partial sensibility somewhat returned, and he vomited a portion of undigested food. Apply hirudines xxiv. to temples, emplast. lyttæ to the back of the neck, cataplasma sinapis to the soles and chest, and cold water to the head.

11 P. M.—Pulse frequent and small, pupils sensible to the light, breathing less affected, vomited again undigested food. ℞ Ammoniæ sesquicarb. gr. v., mist. camphoræ ℥i. mft. mist. to be given immediately and repeat every hour. His head to be kept constantly wet, and the draught continued; he gradually rallied; at 2 o'clock in the morning he became sensible and spoke quite rationally.

11*th May*, 6 P. M.—Is quite rational, says he is quite well; pulse regular, skin natural, no head-ache, tongue foul, bowels not opened. ℞ Magnesiæ sulphat. ℥ss, aqua mentha. pip. ℥i. mft. mist. to be given immediately. He was suddenly seized with an apoplectic fit, became speechless and comatose, with stertorous breathing, contracted pupils, quick strong pulse, and hot burning surface; he was placed under the cold douche, the dose of calomel and tartar-emetic repeated, and a blister covering the whole scalp. These measures failed to rally him. He gradually became insensible, breathing more laborious, with intermitting pulse. Ammonia sesquicarb. grs. v. with camphor mixture given and repeated, mustard sinapism to the chest and soles; he passed two involuntary motions, and gradually sunk; expired at 12 P. M. No *post-mortem* examination was made.

No. 13.

*Cases of Coup-de-Soleil at Shikarpoor.**—By Assistant Surgeon A. K. Simpson, M.D.

Case No. 1.

1858, 10*th June*.—J. H. B., Private, H. M.'s 51st Regiment, aged 25 years, service in India 6 months. Patient admitted on account of intermittent fever and head-ache, which have been of two days' previous duration. Had opening medicine after admission yesterday, and bowels have been freely moved; feels much better this morning; head-ache still complained of: an eighth of a grain of tartar-emetic in an ounce of quinine mixture to be given at a time, for 3 doses. A little before two o'clock P. M. I received word that this patient had been suddenly seized with symptoms of "coup-de-soleil." He was reported by the Assistant Apothecary to be frothing and oozing of blood at the mouth; his pulse small and irregular, skin hot and burning, pupils partly insensible and contracted, does not speak when roused, grinds his teeth, bowels involuntarily moved just now.

Meantime appropriate treatment had been promptly applied: the patient's head and shoulders had been elevated, two dozen leeches had been applied to temples, and cold water constantly poured on wet cloths over the head; hot-water bottles had been put to his feet.

13*th*.—On visiting the patient I found him in the state above described, but the symptoms were becoming rapidly more alarming. His breathing had now become more laborious and noisy, chest expansion being imperfect, the heart-beats were rapid and full, the radial pulse was feeble and irregular, the femoral and temporal arteries beat strongly, the pupils were contracted, and the eye-ball had a wild and prominent appearance, and no sensibility was evinced even under pressure with the finger. One dozen more leeches were applied to the temples after my arrival. The crown and back of the head were shaved, and a blister put on; cold water was constantly poured on the head. Before my arrival a sinapism had been applied on the region of the heart, as well as on the back of the neck; small doses of liquor ammonia were attempted to be administered, but the patient had lost all power of deglutition.

The patient by this time had passed into a state of hopeless coma. His breathing became more laborious and noisy, the lungs having been gorged with venous blood, utter insensibility and coma continued. Less than an hour after my visit he died, having been little more than two hours under these symptoms. This patient was struck down by the sun in a marvellous and sudden way, while going across a small compound behind the hospital to the

* *Vide* foot-note p. xxx.

privies, without any covering on his head. He was observed to leave the ward, but was understood to be going the usual way—along a covered passage. He had not been three minutes out of the wards when he was found outside staggering, and trying to return. He was assisted into the ward, when he became instantly delirious and unmanageable, requiring at first to be forcibly held down on his bed.

Post-mortem Inspection.—Four hours after death the body was examined. Like such modes of dying, the natural warmth almost was retained even so long after death.

Head.—The skull-cap having been removed, the following appearances were found. In the skull-cap itself there were two or three drachms of blood, showing that effusion had taken place externally to the membranes of the brain. Between the dura mater and arachnoid blood was effused over all the extent visible. When cut into, the substance of the brain presented no traces of effusion. There was only very partial effusion into the ventricles. The chief effusion had taken place on the vertex and fore parts of the head. All the other organs of the body were healthy.

Case No. 2.

1858, 28*th June.*—Gunner E. W., No. 1 Company Reserve Artillery, aged 28 years, service in India 9 years. Admitted into Hospital about 6 P. M. in a state of insensibility. The symptoms were violent throbbing of the temporal arteries; feeble, rapid, faltering, radial pulse; laborious respiration; inability to speak or move. No account given of patient on his admission into hospital; was promptly treated by the Assistant Apothecary, who applied leeches (2 dozen) to temples, a sinapism over cardiac region, local heat to extremities, cold water to head; and attempted to administer stimulants (ammonia in small doses), but power of deglutition had failed. The back of the head was shaved, and a blister applied. I was immediately called, and saw him 20 minutes after admission. I found his symptoms were the effect of "coup-de-soleil," although no evidence had yet appeared that he had been exposed to the sun. He was already in a hopeless state; the pupils insensible to light, or pressure with the finger; the temporal arteries pulsating strongly, the radial pulse feeble, rapid, and irregular; the respiration laborious and interrupted; the action of the heart rapid and tumultuous. An enema of castor oil ℥i., croton oil ♏i. and water ℥ii. had been administered before my arrival, and operated twice. The head and shoulders were elevated. The symptoms continued gradually to become worse: respiration slower, more laborious, and sometimes ceasing a little; the heart beating rapidly, but more feebly; arterial pulsation growing indistinct, except of the femoral artery under Poupart's ligament, where the sensation communicated by feeling the artery seemed like a continuous tremor. The tibial arteries ceased

to pulsate distinctly about half an hour before death; the right foot became cold, the left meantime retaining its natural heat, as well as the other parts of the external surface. The patient died comatose, exactly 2 hours after admission into hospital. A short time after his death, I learned that deceased had been noticed in the sun, with a towel on his head, at 5 P. M. Next morning I found out that he had been seen also at 4 P. M. with a towel on his head walking from his quarters to the necessaries, a distance of 100 yards, or thereabouts. When observed before admission into hospital, deceased was staggering about in the verandah of the Barracks, with a wet towel on his head. He was able then to move about, but could answer no questions. From some accounts he appears to have had slight fever in the morning. A short time after his death, and before I left the hospital, a small tin box was found concealed in one of his stockings. This box contained extract of opium. On inquiry I learned that deceased had been secretly an opium-eater for several years; but this discovery did not alter my opinion that the immediate cause of death had been exposure to solar heat, though satisfactory evidence, independent of the symptoms, was not found until next morning.

Post-mortem Appearances.—The inspection was necessarily imperfect, because it had to be conducted hurriedly, and by means of candle-light, the body requiring to be ready for removal at ¼ before 6 A. M.

Head.—When shaved, the scalp gave the appearance of unusual venous congestion. Internally, blood was extravasated between the membranes, especially towards the left temple. The other organs were not examined.

No. 14.

*Case of Coup-de-Soleil in the 3rd Troop H. A.**—By Assistant Surgeon J. H. Wilmot, M.D.

Gunner R. L., 34 years of age, 13 years in India, a man of good constitution, very athletic frame, and of temperate habits, was brought into hospital about 2 P. M. on the 21st of June 1858, with the following symptoms:—Violent convulsions, so that four men could, with difficulty, prevent him rolling from the charpoy to the ground; high, bounding pulse, action of the carotids excessive, conjunctivæ exceedingly vascular, pupils fixed, and insensible to light, but not much contracted, and the entire surface of the body dry and burning. The head was immediately shaved and cold douche used, the legs were placed in a tub of hot water, and the rest of the body frequently sponged with cold vinegar and water, three dozen leeches were applied behind the ears and to the temples, and three drops of croton oil administered. This treatment

* *Vide* foot-note at p. xxx.

proved ineffectual in abating either the frequency or violence of the convulsions, and he was bled from the arm in a large full stream, and about a pound of blood taken away. A quarter of a grain of tartar-emetic was given every half hour. After about two hours, the convulsions gradually subsided, the pulse was much lowered, the skin became covered with profuse perspiration, the vascularity of the conjunctivæ was very much less, and, though not able to speak, he was conscious. The tartar-emetic was discontinued, sinapisms were applied to the calves of the legs, some warm arrowroot, with a very small quantity of brandy, was given, with an occasional dose of spt. ammoniæ aromat. He rapidly improved, and about 8½ P. M. fell asleep until daylight, when he appeared perfectly recovered. Skin warm and moist, pulse soft, tolerably full, and about 65 or 70, pupils natural, is perfectly conscious and collected, bowels had been three or four times opened, and he eat some arrowroot with good appetite. On the whole he seemed out of danger. I, nevertheless, thought it would be advisable to get him under the influence of mercury as soon as possible, and commenced with frictions of strong mercurial ointment, and gave him a scruple of calomel. The douche was occasionally, and clothes wetted with vinegar and water constantly applied, and broth to be given in a couple of hours. He remained very well, and in good spirits, until the day began to get hot, when about 10 A. M. a dust-storm commenced to blow. From this time he grew very restless, tossing about and changing his position every moment, and sighing and gasping frequently. A large sinapism was applied over the chest and abdomen, and ammonia afforded temporary relief. As the day advanced, the heat in the tent became extreme (119°), accompanied by a fiery hot wind; a little after noon he was again convulsed, and expired during the paroxysm. This man had been exposed all day, without cover, on the 17th, 18th, and 19th of June, during the several actions, and also for the principal portion of the 20th and 21st, as camp colorman, in marking out the new camp. On the last named day, he wore his forage-cap without a proper protection.

No *post-mortem* examination was made.

No. 15.

Case of Snake-Bite.—By Assistant Surgeon J. M. Barnett, M.D.

M. G., Private, 6th Regt. N. I., admitted 1st October 1858, aged 34 years.

1st October 1858.—I was called to the lines a little after 10 o'clock A. M. by the report that a sepoy had received a bite from some animal, and was insensible, or partially so, with the part bitten and hand much swollen. He had been talking incoherently, had received the bite 2 hours previously, and

had bathed and washed during the interval. I saw him immediately, and at once placed ligatures round the two bitten fingers, viz. fore and middle of right hand, and also a tape round the wrist of same hand. He had been passing his hand under the chupper of his hut to place the door-key there, when he received the wounds. The cuts were four or five in number over the back of the last joints of the fingers bitten; and when I saw them they had ceased to bleed. The fingers and hand were much swollen, the eyes half-closed, pupils dilated and insensible to light, pulse weak and slow. The head hung heavily, and his breathing was partially affected, and the mouth filled with tenacious mucus. After the application of the tapes, I at once incised the wounds, and applied lunar caustic freely to the parts, then gave him a stimulating draught containing brandy 3iii. and 3ii. of the aromatic spirits of ammonia. Part only of this he was able to swallow; the remainder, with ℥i. of brandy added, was injected by the rectum. The mouth was cleared of the mucus, and he was ordered brandy ℥ss, spirit ether nit. 3i. in a little water; but he was unable to swallow the draught; and the pulse, which twenty minutes before was 72, now had sunk to 54, and was weaker. Hot bottles had been applied to the feet, and friction with hot turpentine was made to the legs, but the treatment did not avail, and within half an hour of his admission the breathing suddenly ceased; and at 20 minutes to 11 o'clock A. M. he expired. For 10 or 12 minutes before death the pulse was small and thready, and the jaws were closed firmly. No inspection.

Remarks.—The bite or laceration was easily recognised as one inflicted by a snake. And, having recently had several cases of snake-bite at Asseerghur, I felt satisfied from the first moment I saw the hand as to the nature of the wound. Two days after the occurrence, the chupper being lifted, and the roof examined, a Cobra-de-capello was discovered and killed close to the spot.

No. 16.

Case of Snake-Bite.—By Assistant Surgeon E. DeCrespigny.

A Muratha prisoner, aged 48 years, was admitted into the Jail Hospital, Rutnagherry, on the evening of the 25th December 1857, having been bitten by a Phoorsa snake on the upper surface of the first phalanx of the 3rd finger of right hand. Is an elderly man, weakly, and of spare habit. No pain, but the hand is swollen; the wound was lanced and cauterized by the Hospital Assistant, on admission.

This morning the hand is much swollen, the swelling extending up the arm, temperature slightly increased, and slight pain complained of. Did not sleep, as he was told that it was dangerous to do so under the circumstances. Bran poultice with camphor.

December 27th.—The swelling of the forearm has subsided, but it has extended to the upper arm; the hand is still swollen, and a little blood has oozed from the bitten part.

28*th.*—Sore much the same, there is a slight oozing of blood from it, swelling less, complains of sickness and a burning sensation in the stomach. Omit camphor in the poultice, the sore to be dressed with nitric acid lotion, a poultice of charcoal, opium, and camphor to be applied, and brandy ℥ii. twice a day in conjee.

29*th.*—Oozing of blood continues, the sore to be touched with nitric acid lotion three times, and the charcoal and opium poultice to be continued.

31*st.*—Complains of faintness and giddiness, otherwise there is no untoward symptom; discontinue bran poultice, the limb to be rubbed with camphorated ammonia liniment, and to be wrapped up in a flannel bandage. Blue pill and colocynth āā gr. v. to-night, and Ol. ricini ℥ii. to-morrow morning.

January 1*st*, 1853.—The sore beginning to look healthy, no longer so sloughy, but there is no purulent discharge as yet.

2*nd.*—No discharge; complains of giddiness.

10*th.*—Since last reports, there has been a purulent discharge, and the sore has nearly healed; slight swelling of the hand remains, otherwise no complaint. Remained some days longer in hospital on account of swelling and tenderness about the upper arm, and then discharged cured.

No. 17.

Case of Snake-Bite.—By R. W. James, M.D., Civil Surgeon, Hyderabad.

(Extracted from the Return of the Civil Hospital, Hyderabad, for the month of July 1856.)

A man was admitted 5 hours after being bitten on the heel by a Lomdee, a venomous snake; pulse small and fluttering, drowsiness, and pain and swelling of the leg, with oozing of blood from the wound. Fowler's solution of arsenic ℥ss doses every hour was ordered, and ammonia and arrack every half hour; he took 17 doses before the peculiar effect of the arsenic became manifest; it was then suspended, but the stimulants were continued; in 4 hours after the first exhibition of the arsenic the oozing of blood from the wound stopped; the sleepiness wore off him, and he stated he felt better. He was discharged quite well.

No. 18.

Case of Snake-Bite in the Civil Hospital, Kurrachee.

12*th September* 1855.—At 4 P. M., Nursoo, cart-driver, was brought to the hospital, stating that he had been bitten by a snake, about 5 minutes previously, on the end of the left little finger; the punctured wounds were lanced and bled freely, the scarified parts were washed with warm water; the man was then made to suck the wounded part as vigorously as possible; this was continued for upwards of an hour, during which he had occasional doses of ammonia; the wound was then covered over with a paste made of Pulvis Ipeeacuanhæ. No bad symptoms, however, supervened. The next morning he left the hospital well.

No. 19.

New Operation for Hare-lip.—By Assistant Surgeon ROGERS, Poona Irregular Horse.

A delicate looking boy, aged about 15 years, and disfigured by the above-named malformation, was brought to hospital on the 24th of January. In addition to the deformity, the lad suffered from an extensively fissured or cleft palate, and presented many marks of a strumous diathesis, besides a very thick upper lip, the angles of which, formed by the fissure, were thick and considerably everted, necessitating a more free incision than would have otherwise sufficed.

Under the influence of chloroform, the edges of the fissure were pared by an incision carried obliquely from before backwards, freely dividing the mucous membrane. Three *sutures* were then used, each armed with two curved needles, which were introduced immediately under the skin, and carried completely through the remaining thickness of the lip, and tied internally. To facilitate the removal of the two upper sutures, the ends were brought out at the angles of the mouth, and retained in position by small strips of adhesive plaster, which were afterwards applied to support the parts, and secure more firmly the divided surfaces. The sutures were removed on the fifth day after the operation, when it was found that firm adhesion had taken place, the union being most complete and satisfactory; and strongly recommendatory of the same plan being pursued in all similar cases.

No bad symptom followed. This simple operation, so easily performed, and so effectual in its results, as shown by other cases which have been

published, particularly recommends itself by the circumstance that no unsightly marks are left, as very frequently occurs in cases where pins have been employed.

No. 20.

Case of Excision of the Knee-joint.—By Assistant Surgeon T. M. Lownds, M.D.

A cultivator, of about 40 years of age, came to hospital at Mount Aboo, in July 1858, complaining of inability to use his right knee. On examination, the leg was found flexed on the thigh, at about an angle of 65°. There was very slight motion, and that only to be produced by the exertion of considerable force, attended with great pain. The whole of the tissues around the knee were much thickened, and the tibia was dislocated backwards, and somewhat outwards on the femur. There was no sinus, nor any ulceration. The patient complained that he could not use the limb, nor sleep at night on account of pain in the diseased knee; all around the joints are marks of the actual cautery.

The history of the case is as follows, but, gathered as it is, from an ignorant hill-man, too much dependence must not be placed upon its accuracy. He states that about two years ago the knee swelled, and was most painful for a long time; that an opening was made into the joint by the application of the actual cautery, from this a considerable amount of pus was discharged, and that the actual cautery was applied in several other places. The leg then gradually improved, the pain, except at night, left it, and it got into its present condition. The patient is otherwise in good health, but unable to use his leg.

He remained a few days in hospital, that I might more particularly observe his general state. I then sent him back to his home, as I thought that any serious operation undertaken during the heaviest of the rains at Mount Aboo did not give as fair a chance of recovery as if it was done during the fair season. On the 6th September he returned, and in consultation with both Drs. Young and Roe, we agreed that excision of the joint, or amputation of the thigh, afforded the only means of eradicating the disease, and enabling him to move about like a human being. Excision of the joint was determined on, as affording hope of an usual limb, and from the mortality of that operation being, according to the statistics of late years, considerably less than that of amputation of the thigh. I was the more induced to try excision, knowing the almost unbounded powers of recovery possessed by natives of the Upper Provinces, and more especially those of the hill tract.

On the 10th of September the patient having been placed under the influence of chloroform, excision was performed in the way recommended by the

late Dr. R. Mackenzie, by the semilunar incision. Great difficulty was experienced from the patella having become firmly anchylosed to both femur and tibia. Of course, no attempt could be made to save that bone, so, after reflecting the semilunar flap upwards from the patella, the remains of the joint were exposed by sawing out the patella with portion of the femur and tibia; after this the remains of the internal and crucial ligaments were divided, and a sufficient portion of the femur (a little more than an inch) and of the tibia were removed. After these bones were thus shortened, and perfectly healthy surfaces left, apposition could be effected and retained without difficulty. The posterior ligament was greatly hypertrophied, and was not interfered with, the slice of bone being simply separated by a scalpel. The operation was necessarily protracted, owing partly to the confusion of parts caused by the original disease, dislocation, and subsequent anchylosis, and partly to the very large number of vessels requiring ligature. This last was, doubtless, caused by the enlargement of the vessels, which had taken place at the time the joint was inflamed and during the subsequent treatment. Above 20 and 25 oz. of blood were lost during the operation. The whole wound was then douched with a large quantity of cold water, the flaps were brought into apposition, and retained by stitches, and dressed with cold water. The limb was placed on a strait *McIntyre* splint, and supported on each side by long sand-bags, loosely filled. I owe much to the assistance of Drs. Young and Roe.

Immediately after the operation, an opiate was administered, and repeated at bedtime.

September 11*th.*—Considerable oozing of blood during the night, slept for some hours; pulse 110°, irritable and weak; arrack ℥i. thrice daily.

Repeat Tinct. opii ♏ xl. at bedtime.

12*th.*—Slight but distinct febrile exacerbation yesterday afternoon. Pulse still quick and weak, dressings removed. Union had taken place on the inner side for about two inches, leaving the inner angle still open. Stitches removed; discharge healthy. Repeat arrack and opiate. To have 3 grains of quinine every 3 hours.

14*th.*—Fever has not returned; pulse greatly improved. It was necessary to remove the whole of the dressing and splint, as maggots had appeared in the portion of dressing immediately behind the ham, there were none in the wound; continue medicines and arrack; turpentine dressing.

16*th.*—Doing well, slight sloughing of the remains of the ligamentum patellæ.

October 1*st.*—Improving rapidly, no untoward appearance; difficulty in keeping the limb straight, from the patient constantly sitting up in bed.

15*th.*—Sand-bags dispensed with, long splint and posterior straight splint applied. Two small sinuses, but apparently unconnected with bone.

30*th.*—Sinuses still open; a small slough has appeared on the heel, edges quite healthy; starch bandaging applied.

November 7th.—Sinuses much contracted, starch bandage seems to have irritated the sinuses ; they are consequently removed.

Remarks.—Anchylosis has taken place, but as the sinuses are still open, this cannot as yet be nearly sufficiently strong to enable me to give any opinion as to the time at which the patient may be able to use his leg. It is quite straight, and there seems every probability that it will be useful. The general health of the patient is excellent ; he has no pain at night, and sleeps well.

Additional Note. 26th April 1859.—The after-progress of this case is not so satisfactory as could be wished. When I left Aboo, about the middle of November, the whole limb was encased in starch splint, and seemed pretty firmly anchylosed in a straight position. The patient remained for a few days under the charge of Dr. Roe. The small sinuses spoken of healed up, and the limb was quite straight. The shortening was about $2\frac{1}{2}$ inches. Dr. Roe shortly afterwards left Mount Aboo on duty, and on his return found that the straight position had been lost; that a small sinus had again opened, and that anchylosis had taken place at an obtuse angle, so that the shortening now amounts to about 4 or $4\frac{1}{2}$ inches. At present he walks slowly with the help of a stick, firm anchylosis having consolidated the limb. On my return to Aboo, about the beginning of this month, I found that the sinus was caused by the presence of small exfoliated spiculæ of bone near the surface. These were removed, and the sinus is now healing kindly.

Although the bending of the limb has rendered the case less successful than might have been anticipated from its earlier progress, yet this has been, I believe, entirely caused by the unavoidable absence of medical care at too early a period. His health is excellent, and, but for the circumstances detailed above, I feel assured that a much better result would have been recorded. Nothing that I have seen in this case would prevent me from recommending a similar operation for other cases diseased in the same manner.

ABSTRACT PROCEEDINGS

OF THE

MEETINGS OF THE MEDICAL AND PHYSICAL SOCIETY,

FOR THE YEAR 1857.

No. 1.

ANNUAL MEETING HELD 3RD JANUARY 1857.

Present;

Drs. Don, Morehead, Arbuckle, Haines, Sylvester, and R. McKenzie.

The election of the Committee of Management for the year 1857 was declared. The following gentlemen were found to be elected:—J. Don, M.D.; C. Morehead, M.D.; A. H. Leith, M.D.; W. Arbuckle, M.D.; H. J. Carter, Esq.; W. C. Coles, M.D.; R. Haines, M.B.; and G. R. Ballingall, M.D.

Dr. Don was unanimously re-elected President, and Drs. Morehead and Leith Vice-Presidents.

The annual accounts were examined, and the balance of Rs. 776-2-9 in the hands of the Treasurers, Messrs. Leckie & Co., was found to be correct.

In accordance with a resolution agreed to, the Bank of Bombay would be requested to become the Treasurers of the Society, and Messrs. Leckie & Co.'s account closed, from the 1st instant.

The account of Messrs. Richardson and Co., London, amounting to £11-15-8, was directed to be discharged.

Letters were read from Dr. W. G. Hunter, Shikarpore; Dr. G. Birdwood, Sholapore; and from Dr. F. T. Bond, Jacobabad—requesting to be enrolled as Members of the Society; from J. Silver, Esq., intimating his wish not to remain a Member; and from Surgeon R. Collum, M.D., requesting erasure of his name from the list of the Medical and Physical Society.

Annual Statement of Receipts and Disbursements of the Medical and Physical Society from 1st January to 31st December 1856.

Receipts.	Rs.	a.	p.	Disbursements.	Rs.	a.	p.
Balance of last account, closed 31st December 1855.	266	2	9	Amount paid for Printing, &c.	68	0	0
Subscriptions received from 1st January to 31st December 1856	812	0	0	Office Establishment and petty charges.....	234	0	0
				Balance transferred to the Bombay Bank	776	2	9
Rupees..	1,078	2	9	Rupees..	1,078	2	9

No. 2.

MONTHLY MEETING HELD 7TH FEBRUARY 1857.

Present ;

J. Don, M.D., *President,* in the Chair.

C. Morehead, M.D., and H. A. Leith, M.D., *Vice-Presidents.*

Members.—H. Miller, M.D.; H. J. Carter, Esq.; C. C. Mead, Esq.; G. R. Ballingall, M.D.; W. Niven, M.D.; R. McKenzie, M.D.; and W. C. Coles, M.D., *Secretary.*

The proceedings of the last Monthly and of the Annual Meetings were read and confirmed.

Letters were from D. Costelloe, M. D., Surgeon, (Fusiliers,) requesting to become a Member of the Society, and he was accordingly unanimously elected under Regulation V.; from Drs. Scott, Broughton, and Beatty, forwarding their subscriptions; from Messrs. Leckie & Co. and the Bank of Bombay, respecting the accounts; and from the Superintendent Government Observatory, forwarding two copies of Meteorological Observations for the years 1854 and 1855, which were directed to be acknowledged with the Society's best thanks.

The paper submitted to the Meeting—forwarded by the Medical Board—was by Dr. Winchester, Superintendent of Mahableshwur, and related to the practice of Midwifery, as the result of his observations and experience, extending over a series of years. The writer discusses several interesting questions bearing upon the subject, and shows that amidst engrossing duties he has found time to record the results of attentive observation, and of careful and successful practice.

Dr. Ballingall then read three cases of Surgery—one extremely rare, of accidental injury to the larynx, the result of a fall, in which it was necessary to perform tracheotomy, and which terminated in complete recovery after a month.

The other cases were interesting chiefly from the preparations which were placed on the table, showing very clearly the result of arterial disease, the one exhibiting the obliteration of the vessels, apparently from inflammation, the other their contraction from calcareous degeneration.

After the Members present had examined these specimens, and some others left over from last Meeting, the best thanks of the Society were accorded to the Medical Board and to Dr. Ballingall for their communications, and the Meeting was adjourned to Saturday, 7th March 1857.

No. 3.

MONTHLY MEETING HELD 7TH MARCH 1857.

Present;

J. Don, M. D., *President*, in the Chair.

C. Morehead, M.D., *Vice-President.*

Members.—H. J. Carter, Esq.; H. Giraud, M.D.; R. Haines, M. B.; G. R. Ballingall, M.D.; T. M. Lownds, M.D.; and W. C. Coles, M.D., *Secretary.*

The following gentlemen were elected Members of the Society under Regulations V. and VI.:—Dr. E. B. Ebden, Bengal Medical Service; and Dr. J. Somerville, of Bombay.

Letters were read from Assistant Surgeon J. R. Miller, M.D., dated 6th February 1857, intimating his wish to withdraw from the Society; from Assistant Surgeon T. B. Johnstone, dated February 16th, desirous of continuing a Member; from J. J. Faithful, dated 25th February, relative to transmission of his subscriptions.

The Annual Report of Vaccination for 1855, presented by the Medical Board, was laid on the table, and the new Number of the Transactions, Vol. III., New Series, was announced as in course of distribution to Members.

The half-yearly Report of the Ghizree Sanitarium, from July to December 1856, by Dr. Fox, was read, which, with others, it is intended hereafter particularly to notice.

Dr. Ballingall then read notes of three cases of Perineal Section (according to Mr. Syme's plan), and which were attended with complete success. The mode of practice pursued led to considerable discussion.

After the best thanks of the Meeting had been accorded to the contributors, the President announced that it was adjourned, as usual at this period of the year, for three months, and that the next Meeting would take place on Saturday, the 4th July 1857.

No. 4.

MONTHLY MEETING HELD 4TH JULY 1857.

Present;

A. H. Leith, M.D., *Vice-President*, in the Chair.

Members.—J. Scott, Esq.; H. Miller, Esq.; H. J. Carter, Esq.; W. Campbell, M.D.; H. Giraud, M.D.; J. Bean, Esq.; T. M. Lownds, M.D.; G. C. M. Birdwood, M.D.; J. Somerville, Esq.; and W. C. Coles, M.D., *Secretary*.

The proceedings of the last Meeting were read and confirmed.

Assistant Surgeon R. G. Lord, M.D., was elected an Ordinary Member under Regulation No. V.; and the following newly arrived Assistant Surgeons, under Regulation VII.:—J. Kearney, Esq.; A. Kelsey, Esq.; T. Miller, M.D.; J. Lalor, Esq.; A. K. Simpson, M.D.; and Rustomjee Byramjee, M.D.

The Meeting then proceeded to elect a President in place of Dr. Don, proceeded to Europe. It was decided that, according to Regulation No. XVII., a President must be chosen from the Committee of Management, and the choice fell unanimously on Dr. Morehead, the senior Vice-President, who was proposed by Dr. Scott, and seconded by Dr. Giraud. To fill the vacant Vice-Presidentship, the ballot was declared in favour of Dr. Arbuckle, and Dr. Campbell was announced as the incoming Member of the Committee under Regulation No. XV.

Letters were read from Drs. Bradley and Rogers, forwarding their subscriptions; from Messrs. Richardson and Co., acknowledging the receipt of a remittance; and from the undermentioned gentlemen, acknowledging the receipt of the last new Number of the Society's Transactions:—the Inspector General of H. M.'s Hospital, Bengal; the Deputy Inspector General of Madras and Bombay; the Principal of the Grant Medical College; the Secretary to the Madras Medical College Council; the Secretary to the Geographical Society; ditto Grant College Medical Society; the Officiating Private Secretary to the Right Honorable the Governor; Dr. Waring, Trevandrum; and Dr. Wood, Bagdad.

From the Secretary to the Mechanics' Institution, forwarding the President's published address of the 11th April last; from the Acting Principal, forward-

ing a copy of the Grant College Report for 1856-57; from Dr. Carter, forwarding, on behalf of Government, a copy of a work entitled "Geological Papers on Western India, &c.," with an Atlas.

These presents were laid upon the table, and were directed to be acknowledged with the Society's best thanks.

The first paper read was a case of recurrent Measles, by Dr. Broughton, Civil Surgeon, Kolapore, which was interesting on account of the comparative rarity of a second attack of measles, and of the severity and long-continuance of the symptoms in the present instance.

It was stated, that in the late epidemic of measles in the Central School, Bombay, secondary attacks had been observed, but that they were usually milder than the primary seizure.

The Secretary then read a short paper on the Hospital Statistics of the Bombay Presidency in 1856-57, as compared with those of the preceding year.

Dr. Lownds laid before the Meeting a specimen of a rare disease, "Cancer of the Liver." Dr. Carter read a communication for Dr. DeCrespigny; and Meteorological Tables from Bushire for February, March, April, and May, as well as from Khandalla, for May, were examined. After the best thanks were accorded to the contributors, the Meeting was adjourned to the 1st August 1857.

No. 5.

MONTHLY MEETING (POSTPONED FROM 1st AUGUST) HELD 5th SEPTEMBER 1857.

Present ;

A. H. Leith, M.D., *Vice-President,* in the Chair.

W. Arbuckle, M.D., *Vice-President.*

Members.—J. Scott, Esq.; A. Burn, M.D.; R. Woosnam, Esq.; R. D. Peele, Esq.; H. J. Carter, Esq.; W. Campbell, M.D.; H. Giraud, M.D.; C. C. Mead, Esq.; R. Haines, M. B; G. R. Ballingall, M.D.; T. M. Lownds, M.D.; G. C. M. Birdwood, M.D.; and W. C. Coles, M. D., *Secretary.*

Visitor.—Assistant Surgeon Grant, Bengal Service.

The proceedings of the last Meeting, held on the 4th July, were read and confirmed.

Surgeon General B. P. Rooke, M.D., was elected a Member of the Society under Regulation No. V.

Letters were read from the Secretary Medical Board, forwarding copies of five Reports on the Cholera Epidemic of 1854, by the different Committees of the Medical Council, under the General Board of Health, London, presented

by the Medical Board, who also forwarded the last number of the Indian Annals of Medicine.

The Journal of the Bombay Branch of the Royal Asiatic Society, presented by the Society, was laid upon the table, and letters read from Dr. John Somerville, Dr. M. M. Mackenzie, and Dr. McAlister, on the business of the Society.

The half-yearly Report of the Sanitarium at Ghizree, from January to June 1857, by the present Resident Medical Officer, Dr. J. Y. Smith, forwarded by the Medical Board, was read. It appears that out of 184 patients (European soldiers) who came under treatment during the six months, 88 were returned to their regiments "cured," 21 "improved," and 9 "no better," whilst 3 had "died," and 3 "remain."

The medium height of the thermometer was 59° in January, 68° in February, 79° in March and April, 84° in May, 86° in June. It descended as low as 45° in January, and rose as high as 92° in May and June; cold weather was experienced throughout the month of January, particularly during the night. About 1½ inches of rain fell during this month, and nearly one inch in February. The atmosphere was clear, and prevailing winds N. E. The cold weather appeared to be somewhat trying to the invalid. In the other months the wind blew more from the North West, and the temperature sensibly increased. The sea-breeze at Ghizree is described as having a peculiarly grateful and genial effect, well adapted for convalescents from severe disease, who are not too much debilitated. The report embraces an account of the particular diseases for which Ghizree is suitable, and of those observed during the last half-year.

Dr. Ballingall then read a paper on Elephantiasis of the Scrotum.

Dr. Ballingall also read an account of a case in which chloroform had produced dangerous symptoms, and in which the Marshall-Hall-method of recovering the patient had been employed with beneficial effect.

The observations led to some discussion on the mode in which death results from an over-dose of chloroform.

Other Members adduced instances in which unpleasant effects were produced by chloroform, but which had been fortunately recovered from.

The Secretary laid upon the table specimens of oil-paper, prepared by Assistant Surgeon Rustomjee Byramjee, intended as a substitute for oil-silk, in surgical dressing.

Dr. Rustomjee's attention was called to this mode of dressing in one of the Glasgow Hospitals, and he introduced its use into the Jamsetjee Jejeebhoy Hospital, where it has been found most successful, and has almost entirely superseded the employment of oil-silk. The comparative cheapness of the oil-paper, the facility of preparation, and the perfect adaptation to the purposes intended, make it one of the most valuable improvements in the appliances of modern Surgery.

Dr. Burn laid before the Society several specimens in Ornithology, which he had collected whilst in Persia, and stated that, at the next Meeting, he would exhibit specimens of plants found by him on the coast of Persia, now in course of being formed into an herbarium. Specimens of native sulphur, and of a description of Carrageen, or Irish moss (Fucus crispus) were also shown.

After the best thanks of the Meeting were accorded to Dr. Ballingall and other contributors, it was adjourned to Saturday the 3rd October next.

No. 6.

MONTHLY MEETING HELD 3RD OCTOBER 1857.

Present ;

A. H. Leith, M. D., *Vice-President*, in the Chair.

Members.—J. Scott, Esq.; R. Woosnam, Esq.; H. Giraud, M.D.; R. Haines, M.B.; T. M. Lownds, M.D.; G. C. M. Birdwood, M.D.; and W. C. Coles, M.D., *Secretary*.

The proceedings of the last Meeting, on the 5th September, were read and confirmed.

T. Powell, Esq., Assistant Surgeon, Bombay Army, was elected a Member of the Society under Regulation No. VII.

A letter was read from Superintendent Government Observatory, forwarding copy of the Magnetical and Meteorological Observations made at the Observatory during 1856, presented by Government.

A communication from Dr. M. M. Mackenzie, Civil Surgeon, Dhoolia, entitled "A Brief Description of the Hill Supta Sing, and its capabilities as a Sanitarium for Troops," was then read. A map of the Hill and Tables of the range of the Thermometer for April and May at Supta Sing accompanied the paper.

On a former occasion (March 1854) the climate of Supta Sing, during April, May, and June, was brought to the notice of the Society in a report by Dr. Pelly, late Civil Surgeon at Nassick, forwarded by the Medical Board, and the additional information and extended tables now furnished will prove hereafter of considerable use in determining the question of the advantages of the Indian Hill Sanitaria for the recovery of the health of, and as stations for European troops.

The following is abridged from Dr. Pelly's Report:—Supta Sing is at the extreme South West corner of Khandeish, about 50 miles South West of

Malligaum, 40 East by North from Nassiek, and is one of a range of hills that separates Khandeish from the Deecan. Its height is about 4,000 feet above the level of the sea. It is approached by roads on the Northern and Southern sides, but the latter is not very good or accessible. The hill is composed chiefly of basalt, capped with a little laterite. The soil is mostly of black earth, and there is some amount of vegetation on the sides of the hill. The average height of the thermometer during the months of April, May, and June was about 4° less than at Malligaum, and 12° less than at Dhoolia, the mean temperature at the hottest period of the year being 79°. The climate is cool and moist, alike agreeable and beneficial to European constitutions, and greatly superior to the stations in the neighbourhood.

A paper on the treatment of Cholera by the inhalation of chloroform, by Dr. Cameron, of the Artillery, Ahmednuggur, presented by the Medical Board, was then read. After a brief description of the origin, nature, and treatment of cholera, the author adduces two cases in which chloroform inhalation was considered to have been very successful.

The Meeting deemed the cases too few to warrant any expression of opinion, but that a cautious trial seemed advisable, although former observers (see Ranking's Half-yearly Abstract of the Medical Sciences, Vol. XIX., pp. 249 to 250) had not reported favourably on the subject. Some of the Members present had used the inhalation of "oxygen" in cholera with apparent success; and others had administered chloroform internally with seeming advantage; but the inhalation of chloroform on theoretical grounds had not many supporters.

Dr. Giraud brought forward seven cases of remittent and intermittent fever, illustrative of the beneficial effects of quinine given throughout the period of exacerbation. Five of them occurred in the same family, in individuals situated, as to locality and mode of living, under the same circumstances, and therefore were peculiarly interesting. The cases were undoubtedly of malarious origin. After detailing the history of the cases, Dr. Giraud draws the following deduction :—"that quinine may be given not only without injury, but with decided advantage, throughout the exacerbation of remittent fever, even when local congestions are manifestly present; that much time is thus gained by not waiting for a remission, and that thus the period during which important organs of the body are subjected to congestive tendency of fever is shortened, and the proclivity to organic lesion diminished."

Allusion was made to the remarks on this subject at p. 243 Vol. I. of Dr. Morehead's Clinical Researches, and some discussion ensued thereon.

A short case, illustrative of the restorative power of nature under severe disease, in a paper by Dr. M. M. Mackenzie, and a brief description of a case of simple Scarlatina by Dr. McDowall, were also read.

After the best thanks of the Meeting were accorded to the contributors of papers, it was adjourned to the 7th November 1857.

No. 7.

MONTHLY MEETING HELD 7TH NOVEMBER 1857.

Present ;

C. Morehead, M.D. ; *President.*

A. H. Leith, M.D., and W. Arbuckle, M.D., *Vice-Presidents.*

Members.—J. Scott, Esq. ; J. W. Winchester, LL.D. ; W. Campbell, M.D. ; C. C. Mead, Esq.; R. Haines, M.B. ; G. R. Ballingall, M.D. ; T. M. Lownds, M.D.; G. C. M. Birdwood, M.D; and W. C. Coles, M.D., *Secretary.*

The proceedings of the last Meeting were read and confirmed.

The following books were presented to the Library by the Medical Board :—

Deaths in Bombay, 1856.

Epidemic Cholera, Diarrhœa, and Dysentery, by Dr. H. Jeanneret.

A Topographical Report of Rutnagherry, by Assistant Surgeon DeCrespigny, drawn up in September 1856, was then read.

This careful and elaborate report embraces the following particulars respecting Rutnagherry :—situation and boundary, facility and mode of communication, prevailing winds, mountains and ranges of advantage for sanitary purposes, seas and rivers, &c., drainage, population, dwelling, clothing, &c. of the people, diet, customs, &c., occupations, native medicines, articles of the Materia Medica found in the bazaar, state of the poor, &c., ratio of disease and mortality, physical character and medical effects of the climates and soil, geological characters, laterite rock, ditto conglomerate lignite and blue clay, trap rock, water, vegetable products, grain, oil seed, arrowroot, animal products, mineral products, state of agriculture, small-pox and vaccination, cholera, snake-bites, diseases of cattle, &c., roads and communications.

The report will probably be published elsewhere hereafter. The attention of the Meething was chiefly directed to the paragraphs bearing on the subject of vaccination and of snake-bites, which elicited some discussion.

A brief memoir on Aden Ulcers (compiled from official papers) by Surgeon Craig, Medical Superintendent of Aden, and Sub-Assistant Surgeon Ruttonjee Hormusjee, was then read, which will also probably appear hereafter in another form.

The wretched state of the hospital accommodation for sick biggaries at Aden had long attracted the attention of the authorities, especially of the late and present Medical Superintendents (Drs. Collum and Craig), and had even been observed and commented upon by medical men passing through Aden. Ulcers of a peculiar character were very frequent, and unless early arrested,

generally proved fatal. The practice was to remove to India (as opportunities offered) all bad and other cases so affected, with the too common result of the individuals dying on the passage or shortly after landing.

On the disease appearing in an aggravated form towards the close of 1856, the present Medical Superintendent, viewing it as a form of "hospital gangrene," cleared the hospital of all its inmates, and forwarded by a favorable opportunity the slighter cases to India, reserving the most aggravated ones to be carefully isolated and attended to in dry and well-raised hospital tents. The result of this experiment, which was vigorously and judiciously carried out by the Superintendent and Sub-Assistant Surgeon, was as favourable as under all the circumstances could be reasonably expected. Of eleven most hopeless cases retained at Aden, five eventually recovered, whilst of the thirty-two slighter cases forwarded to India only one died on the passage, fifteen were admitted into the Jamsetjee Jejeebhoy Hospital, and all improved except one individual.

The Meeting acquiesced generally in the views of Dr. Craig, that under an improved system of diet and proper hospital accommodation (measures now in course of progress) the disease will be lessened, if not entirely removed from Aden; but the question of hospital gangrene was still considered open to discussion.

After the best thanks of the Meeting were accorded to the contributors, it was adjourned to the 5th December 1857.

No. 8.

MONTHLY MEETING HELD 4TH DECEMBER 1857.

Present;

A. H. Leith, M.D., and W. Arbuckle, M.D., *Vice-Presidents.*

Members.—J. W. Winchester, LL.D.; R. D. Peele, Esq.; H. Giraud, M.D.; C. C. Mead, Esq.; G. R. Ballingall, M.D.; T. M. Lownds, M.D.; G. C. M. Birdwood, M.D.; and W. C. Coles, M.D., *Secretary.*

The proceedings of the last Meeting were read and confirmed.

Letters were read from the Director-General Army Medical Department, London, dated 6th October 1857, acknowledging the receipt of two copies of the 3rd Volume of the Transactions; from the Librarian, Middlesex Hospital, on the same subject; as also from the University of St. Andrews; from Assistant Surgeon Croudace, Madras Establishment, requesting to be enrolled

a Member of the Society; from Surgeon Costelloe, 1st Fusiliers, with advice about his subscriptions; and from other Members on the business of the Society.

The following books were presented to the Library:—

The Transactions of the Bombay Geographical Society for 1856-57, by the Secretary.

The Dublin Quarterly Journal of Medicine for September 1857, by the Editor.

Rules for the Control and Management of the Lunatic Asylum, Bhowanipore, by the Medical Board, Bombay.

The following gentlemen were elected Members of the Society under Regulations VI. and VII.:—T. Croudace, Esq., Assistant Surgeon, Madras Service; and A. A. Mott, Esq., Bombay Army.

"Topographical Details of Kolapore," by Assistant Surgeons Broughton and Roome, were then read. This paper was drawn up towards the close of 1856, and is intended to form one of a series of such reports on different stations of the Bombay Presidency, to be hereafter published.

The situation, boundary, elevation, facility, and mode of communication of Kolapore are described; also the prevailing winds, &c., hill ranges suitable for sick or convalescents, amongst which the dismantled hill of *Punallah*, ten miles distant from the city, is said to be admirably adapted for a Sanitarium, the temperature being 12° below, and the elevation 975 feet above, that of the plain, abundantly supplied with excellent water, and being remarkable for its exemption from cholera, although the surrounding villages are yearly ravaged with the disease. The absence of cholera is ascribed partly to elevation, but chiefly to the purity of the drinking water, which is impregnated with iron, and is not contaminated by washing of clothes, &c. The population of Punallah is about 1,500; the walls are about seven miles in extent; and the area would afford ample accommodation for troops. The hill is composed of red soil of varying depth, supported on pillars of basalt. The bazaars are well supplied, and fruits and coffee are produced of excellent quality.

Dr. Broughton then mentions the rivers around Kolapore, which join the Krishna, the wells and tanks, and ancient water-course, reservoirs for water, &c. The physical character and medical effects of the climate, with the highest, medium, and the lowest range of the thermometer are given. The average temperature for the last ten years is nearly 76½°, and the fall of rain nearly 40 inches, but the average of the first five years was about 4 degrees less of temperature, and nearly 10 inches less of rain. The increase of both temperature and rain during the last five years is observed also in the surrounding districts, and is ascribed by Dr. Broughton to the partial conservation of forests, and interdiction to destroying the jungles.

The nature of the soil is then described, and the mineral, vegetable, and animal products examined; the state of agriculture and the means of commu-

nication are mentioned. The prevalent diseases of the country are described; also the influence of imprisonment on the predatory tribes, &c.; the state of barracks (for Native troops only), their date of erection, mode of building, dimensions, &c., supply of water, nature of the soil on which built, aspect, freedom from damp, the regimental hospital, &c. To complete the medical history of Kolapore, the Civil Surgeon's Annual Report for the year ending 31st December 1856 was read, in which the diseases most prevalent in the infantry corps, jail, and civil hospital are passed in review. Many interesting details are given, such as the exemption of the jail from cholera, the effect of confinement on health and *weight* of prisoners, &c. &c. The number of cases of surgical operation at the dispensary (244), and the analysis of poisons for medico-legal purposes, with an account of vaccination, conclude the report.

The Annual Report of the Civil Surgeon, Rutnagherry, embracing numerous cases of interest and importance met with and described by Dr. DeCrespigny, was then read.

A case was also read of Valvular Disease of the Heart, in a scorbutic subject, by Assistant Surgeon M. M. Mackenzie, Civil Surgeon, Dhoolia, in which fatty degeneration of that organ was supposed to be present.

Dr. Lownds showed two examples of abnormal origin of the vertebral arteries; one (not very uncommon) of the left vertebral, arising from the arch of the aorta between the origin of the common carotid and subclavian arteries; the second (a very rare abnormality) of the right vertebral artery, arising from the thoracic aorta, opposite the intervertebral cartilage, between the fourth and fifth dorsal vertebræ. This variety is not noticed by Tiedeman or Quain.

Dr. Lownds then drew the attention of the Meeting to some points connected with the physiology of respiration, which elicited considerable discussion, especially regarding the influence of varying states of atmospheric pressure over the acts of respiration, and interchange of gases,—a subject which does not seem to have arrested the attention of previous physiological enquirers and writers.

After the best thanks of the Meeting had been accorded to the contributors, it was adjourned to Saturday, 2nd January 1858.

ABSTRACT PROCEEDINGS

OF THE

MEETINGS OF THE MEDICAL AND PHYSICAL SOCIETY,

FOR THE YEAR 1858.

No. 1.

ANNUAL MEETING HELD 2ND JANUARY 1858.

Present ;

Drs. Morehead, Leith, Woosnam, Carter, Giraud, Coles, Mead, Ballingall, Lownds, and Birdwood.

The election of the Committee of Management for the ensuing year by the votes of all Members of the Society was declared. The following gentlemen were found to be elected :—Drs. Rooke, Scott, Morehead, Leith, Arbuckle, Giraud, Coles, and Ballingall.

The election of Office-bearers for the year 1858 then took place. Dr. Morehead was unanimously elected President; Drs. Scott and Leith Vice-Presidents; and Dr. Coles Secretary.

The annual accounts of the Society were laid on the table, of which the following is an abstract :—

Receipts.	*Rs.*	*a.*	*p.*	Disbursements.	*Rs.*	*a.*	*p.*
To Balance 1st January 1857	776	2	9	By printing 400 copies of 3rd vol. New Series of the Transactions	1,158	14	8
Subscriptions received during the year 1857	699	4	0	Bill on England due to Richardson & Co., London..	113	8	10
Government for 100 copies of the Transactions.....	500	0	0	Stationery & Office expences during the year	211	7	6
				Balance in the Bombay Bank	491	8	5
Total..Rupees	1,975	7	9	Total..Rupees	1,975	7	9

It was proposed by Dr. Giraud, seconded by Dr. Ballingall, and carried unanimously—"that the best thanks of the Society are due to the Secretary for his services during the past two years." The Meeting then adjourned.

No. 2.

MONTHLY MEETING HELD 6TH FEBRUARY 1858.

Present ;

C. Morehead, M.D., *President,* in the Chair.

J. Scott, Esq., *Vice-President.*

Members.—R. Woosnam, Esq.; H. J. Carter, Esq.; W. Campbell, M.D.; H. Giraud, M.D.; C. C. Mead, Esq.; J. Bean, Esq.; T. M. Lownds, M.D.; G. C. M. Birdwood, M.D.; and W. C. Coles, M.D., *Secretary.*

The minutes of the last Monthly and of the Annual Meeting were read and confirmed.

The minutes of the Committee recorded since the last Meeting on the following subject were also read and approved.

The President submitted, that it would be courteous and right of the Committee to request the Director-General of the Medical Department to allow himself to be nominated Patron of the Society in the place of the Medical Board, no longer existing; and that in the event of Dr. Rooke's concurrence, and in accordance with the usage of similar institutions, he will cease to be a Member of the Committee, and the Member of the Society (Dr. Carter) who had the next largest number of votes will take his place.

This proposition was agreed to by the Vice-Presidents and Committee, and the published lists of the Office-bearers of the Society were altered accordingly.

Letters were read from Assistant Surgeons Atkins, Barnett, Plumptre, Bell, and Niven, requesting to continue Ordinary Subscribing Members of the Society under Regulation V., after the expiry of two years from entering the Service; and from Assistant Surgeons Seward, Wakefield, and Asher, intimating their desire to withdraw from the Society at the end of the same period.

Letters were read from the Secretary to the Royal College of Surgeons, England, and from the Society of Apothecaries, London, acknowledging with thanks the receipt of the last number of the Transactions.

From the Secretary to the Director-General, Medical Department, stating that, at the request of the President, Vice-Presidents, and the Committee, it would afford him much pleasure to become the Patron of the Society in the place of the late Medical Board, and that it would be his endeavour to afford the Society every aid in his power.

H. D. Glasse, Esq., Surgeon, 2nd Battalion Artillery, was duly elected a Member of the Society under Regulation V.

The following books were presented :—

The Annual Report of Vaccination in Madras for the year 1856, from Government.

The Dublin Quarterly Journal of Medicine for November 1857, by the Editor.

Report on the Yellow Fever in Norfolk, America, in 1855, presented by Dr. Ely.

A Topographical Report of Belgaum, by Surgeon Waller and Assistant Surgeon Nuttall, with appendices, was read.

This is an elaborate report, drawn up with great care, and will prove a valuable reference hereafter when printed. It describes the situation of Belgaum, the hills and rivers near, the vegetation, inhabitants, language, state of agriculture, manufactures, indigenous drugs, geological features, temperatures, seasons, comparative healthiness of the people, immunity from epidemic diseases, register of dispensary and other institutions, &c. &c. &c. The appendices contain a topographical report of Belgaum by Dr. Nuttall, drawn up with great clearness and brevity, and an extract from Licutenant Ayton's Geological Survey of the Belgaum Collectorate, and tables of the population of Belgaum, &c., with otheir statistical information.

A paper was then read on the application of the philosophy of heat to clothing, by Assistant Surgeon McDowall.

The writer, after enumerating the different sources of heat, and entering into a consideration of its effects on the human body,—urges the judicious adaptation of clothing both of the head and body, as particularly necessary in India,—dwells on the importance of light, loose, thin garments, of a suitable texture, as especially neeessary for the European soldier in India,—and insists that the covering for the head should also be light, easy-fitting, and with suitable prevention from the direct rays of the sun, and from reflected and radiated heat.

Dr. Carter then drew the attention of the Society to some further observations on the "Dracunculus" or guinea-worm, particularly with reference to the remarkable resemblance in some respects to the so-called "Tank-worm," the anatomy of whose organs he then described. He is still of opinion that whatever the embryo of the guinea-worm may be, it enters the human body through the skin, and not by way of the stomach.

The next paper by Dr. Carter on the Worm "Naïs" was intended to show, that spermatozooa may be produced from dermal or from floating cells of the peritoneal cavity (the latter supplying also the biliary cells which line the intestine) as the case might demand; while, from the latter, it took place in the ovisae along with the ovum, both proceeding *pari passu* in development, and arriving at maturity together.

The Medico-legal cases brought forward by Dr. Carter were interesting, chiefly from the instruments used very frequently in Bombay in procuring criminal abortion being shown to the Meeting as having been found in some late instances, which were detailed.

After the best thanks of the Meeting had been accorded to the contributors of papers, it was adjourned to the 6th March 1858.

No. 3.

MONTHLY MEETING HELD 6TH MARCH 1858.

Present ;

A. H. Leith, M.D., *Vice-President,* in the Chair.

J. W. Winchester, LL.D.; H. D. Glasse, Esq.; R. Woosnam, Esq.; T. M. Lownds, M.D.; G. C. M. Birdwood, M.D.; and W. C. Coles, M.D., *Secretary.*

The minutes of the last Meeting were read and confirmed.

Letters were read from Assistant Surgeon Pinkerton, and from Assistant Surgeon Croudace, Madras Service, forwarding their subscriptions; from C. Morehead, M.D., resigning the office of President of the Society, on his departure from Bombay. This letter was directed to be acknowledged with the great regret of the present Meeting, at the loss of the eminently valuable services of their recently elected President, who, although closely connected with the Society since its commencement, as Secretary, Member of the Committee, and Vice-President, had only very lately succeeded to the Presidential Chair.

A ballot then took place for the election of a President to succeed Dr. Morehead, when J. Scott, Esq., Inspector-General, Medical Department, one of the Vice-Presidents, was found to be elected. For the vacant Vice-Presidentship, W. Arbuckle, M.D., was duly elected; and R. Haines, M.B., brought upon the Committee as Member, who at the last annual election had the number of votes next to those then elected.

The Annual Report of the Civil Dispensaries, Madras, for the year 1856, presented by the Director-General, Medical Department, was laid on the table.

The first paper brought before the Meeting was a concise and admirably drawn up Topographical Report of Jacobabad, by Assistant Surgeon Bond, of the Sind Irregular Horse, which will not suffer condensation, but which, with others, will be hereafter published.

Dr. Johnstone's remarks on Vaccination referred to several points of interest which presented themselves to his notice on an examination, within the last few months, of about 1,100 Concanee recruits for the Native Army, drawn from those districts of the Concan in which vaccination had been for a long period carried on. He found that out of 1,096 men so examined (all, it is presumed, under 20 years of age) only 440 or 41 per cent. had been vaccinated; of these 329 or about 75 per cent. were perfectly protected against natural or inoculated small-pox; 50 had the natural disease, and 61 the inoculated small-pox, after vaccination.

Dr. Johnstone accounts for the small number vaccinated 15 or 16 years ago to the comparative paucity of vaccinators then employed,—to the extensive

practice of inoculation, and to the ravages of the natural disease itself. But he correctly observes, that it was only in the infancy of vaccination that so severe a test has been applied to it, as inoculating a person with small-pox after he had been vaccinated. That vaccination, as conducted by native vaccinators in this country, could pass through such an ordeal without detriment, is not surprising; but the present examples show that the prophylactic was on the whole eminently successful. There can be no doubt that the object of parents in having their children inoculated, after vaccination, arose from distrust in the protective power of vaccination, and this, the more so, perhaps, in proportion as the native vaccinators were loud in their protestations of its protective power. It appears, however, that the subsequent small-pox, after vaccination, whether natural or acquired, is singularly mild, and Dr. Johnstone states that if the 111 recruits were drawn up and carefully examined for the marks of small-pox, the observer's attention would not be attracted to the prominence of a single case.

Dr. Glasse then brought before the notice of the Meeting certain statements made in Dr. Livingstone's Missionary Travels in South Africa, regarding the obnoxiousness of certain animals, and the immunity of others, to the bite of the Tsetse Fly, and considered that further evidence was required to corroborate such startling conclusions as those arrived at by the author, opposed as they are to all physiological and pathological deductions. In this view, the Meeting, after some considerable discussion on the topics introduced, agreed.

The Secretary then read a few notes on the health of the European Troops lately arrived on their voyage from England to Bombay and Kurrachee. The paper was drawn up from an examination of the journals of 24 Medical Officers, and related to the diseases met with, the practice pursued, and the general health of the men on embarkation. The subject is still under prosecution, and will, hereafter, if completed, appear in the Society's Transactions.

After the best thanks of the Meeting were accorded to contributors, the Chairman announced that according to the rules there would be a recess of three months, and that the next Meeting would be held on 3rd July 1858.

No. 4.

MONTHLY MEETING HELD 3RD JULY 1858.

Present ;

J. Scott, Esq., *President*, in the Chair.

A. H. Leith, M.D., and W. Arbuckle, M.D., *Vice-Presidents.*

Members.—C. Morehead, M.D.; J. W. Winchester, LL.D.; H. D. Glasse, Esq.; R. Woosnam, Esq.; H. J. Carter, Esq.; W. Campbell, M.D.;

H. Giraud, M.D.; R. Haines, M.B.; G. R. Ballingall, M.D.; G. C. M. Birdwood, M.D.; H. V. Carter, M.D.; and W. C. Coles, M.D., *Secretary*.

The proceedings of the last Meeting, held on the 6th March, were read and confirmed. Letters were read from J. Scott, Esq., and W. Arbuckle, M.D., in acknowledgment of being elected President and Vice-President, respectively; from R. J. O'Flaherty, Esq., Staff Surgeon, 1st Class, Bombay, intimating his desire to become a Member of the Society; from R. Dick, M.D., wishing to continue a Member after the expiry of two years from entering the Service; from Surgeon Mockler, 17th Dragoons, acknowledging the receipt of a circular letter, No. 12, of the 24th May; from several Members on the business of the Society, with respect to their subscriptions.

The following books, presented by the Director-General, Medical Department, were laid on the table:—

The Indian Annals of Medical Science, Vol. IX. for January 1858. Deaths in Madras during 1855. The Dadabetta Meteorological Observations from 1851 to 1855. Memorandum on the Pauchontee or India Gutta Tree of the Western Coast, by H. Cleghorn, M.D., Conservator of Forests, Madras. From the Editors, in exchange:—The Dublin Quarterly Journal of Medical Science, No. 49, for February, and No. 50, for May 1858. The British Medical Journal, being the Weekly Journal of the British Medical Association, received fortnightly, by mail. From the Authors:—A continuation of the Medical History of the Central Schools, Bombay, from July 1852 to July 1858, by H. J. Carter, Esq., Surgeon. On Elephantiasis, as it exists at Travancore, by E. J. Waring, Esq., Madras Medical Service. Meteorological Observations on Parishnath Hill, by Dr. J. Von-Liebig, Bombay Medical Service.

The following gentlemen were elected Members under Regulation No. VI.—R. J. O'Flaherty, Esq., Staff Surgeon, 1st Class, Bombay. Under Regulation VII.—A. N. E. Riddell, Esq., T. A. F. Scott, Esq., and H. V. Carter, M.D., Assistant Surgeons, Bombay Army.

The first paper presented by the Director-General, Medical Department, was a Memorandum on the Sanitarium at Poorundhur, by C. Morehead, M.D., Acting Superintending Surgeon, Poona. Dr. Morehead (who was accidentally present, owing to public business, in Bombay) briefly stated the object he had in view in publishing the Memorandum. The foot-note at page 1, he said, explained his meaning:—"This memorandum has been prepared, after full consideration of the reports of the several Medical Officers, and careful personal inspection of the Sanitarium and the Invalids at present (May 1858) resident there, in the hope that it may be useful to Medical Officers in charge of European Troops, more especially those who have recently arrived in the Poona Division. It makes no pretension to having exhausted or fully developed the subject, and is intended to be suggestive, not dogmatic." Poorundhur, distant from Poona nineteen miles, was established in 1852 as a Sanitarium for convalescent European soldiers, chiefly from the Deccan, Guzerat, and

Scinde. It is about 4,200 feet above the level of the sea. Its mean temperature throughout the year is between 64° and 80° of Fahrenheit. The average fall of rain is about seventy-two inches, and the general direction of the wind North West. "The object of the Sanitarium is to promote the restoration to health and strength of European soldiers who have become debilitated from the effects of climate, or from recurrences, or from long duration of various forms of disease, and thus to increase their efficiency, lessen their liability to suffer from severe types of disease, and add to the probabilities of lengthened service. These beneficial results occur with greater certainty in convalescents in whom there exists no internal organic disease or marked tendency to it. It will, therefore, be found that the young soldier derives more benefit from the climate of Poorundhur than the soldier of ten years' service and upwards in India."

Dr. Morehead was anxious to impress this fact on the Meeting, and observed, "that complete restoration to health and strength from a residence at Poorundhur will be chiefly found to occur in the soldier of a few years' service in India, in whom a proclivity to attacks of malarious fever has not become firmly established, and organic disease is as yet slight and remediable in character. If such as respects previous disease be also the condition of the soldier of ten years' service and upwards, then to him also the climate of Poorundhur will prove very beneficial. The tendency of the advantage thus gained will be to maintain and increase the vigour of the constitution, to render it less predisposed to the severer forms of disease, and thus prolong the period of the soldier's efficient service in India. But when the soldier has served in India ten years and upwards, and during that period has frequently suffered from disease, and the question of invaliding has arisen, then, though it may be of advantage to him to pass at Poorundhur the period that it may be necessary for him to remain in India, still it is not to be expected that residence there will be in any respect, under these circumstances, a substitute for invaliding, or will lessen the number of unfits of this class."

Dr. Morehead remarked—"From the commencement of the month of March to the middle of November is the season during which these advantages will be gained. The period of residence required for complete restoration of strength will vary in different cases, and its determination should be left to the discretion of the Medical Officer in charge of the Sanitarium."

For the precise application of the climate of Poorundhur, and the diseases for which it is not applicable, the Memorandum furnishes ample details.

One observation, Dr. Morehead thought, had been too much lost sight of, viz: that a resort to a Sanitarium such as Poorundhur was not intended for soldiers actually labouring under present diseases, but for convalescents, and those who were recovering or recovered from disease. He referred to the 10th paragraph of the Memorandum, which bore on this point, thus:—

"The transfer of sick, in states and stages of serious disease, at the time requiring care and medical treatment, in the hope that these may be conducted with more advantage at Poorundhur, was not in contemplation when the Sanitarium was established, and there has been nothing in experience there since to justify this proceeding, but much to dissuade from it. It is, doubtless, disheartening and unsatisfactory to watch disease progressing, notwithstanding our best efforts to remove it; but this event is not to be remedied by the heedless transfer of sick from station to station. It is to be lessened—1*st*, by such sanitary measures in regard to barracks, hospitals, dress, rations, duties, amusements, and judicious use of hill and other Sanitaria as shall maintain the health and vigour of the soldiers at as high a point as practicable, and therefore less prone to the severer types of disease; 2*nd*, by such careful study of the pathology and rational principles of treatment of disease in India as shall teach us to distinguish, at the earliest periods, all serious forms of disease, and to conduct the cure with watchful care and steady judgment."

There was only one other subject which called for remark, and which Dr. Morehead had pressed on the attention of the authorities, viz: —that there were certain forms of disease for which the climate of Poona from November to February is not favourable, and for which Poorundhur is worse; also, some other diseases for which both Poorundhur and Poona are quite unsuited in the hot months of the year. For these diseases, a Sanitarium on some well-selected site on the sea-coast would, at the present time, be a great boon; and, considering the importance of preserving the health and lives of European soldiers in India, a great advantage to the State.

Some discussion ensued as to the best site for a sea-coast Sanitarium, and Bandora, Vesava, Dapoolie, and other places were mentioned as likely to be eligible.

Portions of the Medical Journal of the Troop Ship "Lord Dalhousie," by E. W. Norblad, Esq., Surgeon, were then read. The ship left England on the 15th December 1857, and arrived in Bombay on the 24th April 1858. Out of 200 East India Company's recruits that embarked, no death occurred. One child, however, died on the passage. There was nothing unusual regarding the health of the men, and the ordinary diseases incidental to a long voyage were met with. The only object in bringing the journal to the notice of the Society was, to show the great care and attention to the health of the men exercised on the part of the Surgeon, the excellent arrangements and judicious treatment adopted, and the careful and complete medical history furnished by Mr. Norblad.

An interesting account of a case of Death by Lightning, by Dr. Nuttall, was then read, and deemed worthy of publication hereafter, as there are but few instances on record of the effect produced upon the living (naked) body by the contact of the electric fluid. In the present instance (that of a native)

the burns on the body were not due to the ignition of clothes (of which the man was without any,) but to the electric fluid, or stroke of lightning itself.

Dr. Birdwood mentioned a somewhat similar case at Sholapore, in which the injury from the "stroke" occurred in the uncovered portion of a man's face.

A reputed antidote to the bite of the "Phoorsa" snake, was then shown, and the letter which accompanied it to Dr. Morehead, by F. L. Gomez, Esq., Surgeon of the 2nd Regiment, Goa, read.

The substance, as received, was handed over to the Curator of the Grant College Materia Medica Museum, and, as opportunities offer, its alleged powers were requested to be tested.

Dr. Giraud remarked that it was somewhat singular, that amongst the native Indian remedies employed for snake-bite, there were many plants of the same natural order, or family, as were used in South America for a similar purpose.

After the best thanks of the Meeting were accorded to the contributors, it was adjourned to Saturday, 7th August 1858.

No. 5.

MONTHLY MEETING HELD 7TH AUGUST 1858.

Present;

J. Scott, Esq., *President*, in the Chair.

A. H. Leith, M.D., *Vice-President*.

Members.—R. J. O'Flaherty, Esq.; J. W. Winchester, LL.D.; R. Woosnam, Esq.; H. J. Carter, Esq.; W. Campbell, M.D.; J. Peet, Esq.; H. Giraud, M.D.; C. C. Mead, Esq.; R. Haines, M.B.; G. C. M. Birdwood, M.D.; H. V. Carter, M.D.; and W. C. Coles, M.D., *Secretary*.

The proceedings of the last Meeting were read and confirmed. Letters were read from the Acting Principal of the Grant Medical College, forwarding the Annual Report of the College for 1857-58. From the Secretary to the Government Central Museum, applying for the loan of the Society's Map of the Geology of India, which it was decided should be placed at Dr. Birdwood's disposal. Dr. Carter laid upon the table, for the inspection of Members, a specimen, about to be presented to the Grant College Museum, by Assistant Surgeon Colvill, of fracture of the skull caused by a stone, in which the individual (a Rajpoot camel-driver) lived for eleven months after receipt of the injury. Preparations, showing the altered state of the brain and its membranes, were also shown.

The first paper brought before the Meeting was an elaborate and highly interesting Topographical and Medical Report of Sawunt Warree, by Assistant Surgeon Kearney, which reflects great credit upon the author's industry and ability, and abstracts of which will be published in the forthcoming volume of the Society's Transactions. The following is the summary of the Report :—

I. Topographical description of the town of Sawunt Warree, including an account of its situation, locality, lake, and scenery, description of the town, the fort, station, hospital, local corps lines, the bazaars, the Warree hill, other buildings, the edible supplies, water supply, labour, and population.

II. Describes the district, the geographical position, boundaries, government, features of the country, nature of soil, its natural products, varieties of rice and grain, mode of cultivation, its forest, its timbers, mineral resources, industrial resources, its geology, botany, indigenous native medicines, zoology, its rivers, roads and forts, its population, their caste, occupation, religion, education, and stature.

III. Climate, seasons, temperature, fall of rain, winds and atmospheric phenomena, the subject of health, diseases of the town during eight years, amount of sickness as respects seasons, and with reference to the more important class of diseases, health of European troops.

IV. The jail, its construction, ventilation, hospital, the diet of the prisoners, labour, classification, clothing of and transfer of prisoners.

V. Details the principal classes of disease by which sickness and mortality have been occasioned, their prevalence and rarity compared with former years, and, in respect to the different seasons of the year, the comparison of the jail compared with that of the sepoys and townsmen, and nature of the mortality. General conclusions on sickness as respects all classes of people.

VI. Remarks on the sickness of the prisoners with reference to the duration of their actual imprisonment, the preponderance of sickness in any particular caste, and the sickness with reference to age.

VII. Describes the features that have generally characterised the sickness of the year, and the forms in which diseases have presented themselves; shows the increase of sickness in the latter half of the year, during an epidemic constitution of the air, and includes an account of the mode adopted in the treatment of fevers.

VIII. Gives a detailed notice of the three epidemics that have visited the station during the year, the circumstances under which they appeared, their subsequent progress, and the description of the atmospheric phenomena which attended them, shows the altered state of the seasons and weather during the past year, and the consequent increase of sickness.

IX. Describes the features, the progress, the number attacked, the mortality, the mode of treatment adopted, and the means used for lessening the mortality of the great epidemic of cholera. Describes the epidemic of mumps,

its history, and peculiarity. Details, lastly, an account of the third epidemic—measles, its general history, number attacked, its features, its severity and peculiarities, and other remarks, gives its treatment and observations on dict.

Dr. Haines then read a valuable contribution to the Chemistry of Mineral Waters, viz :—On the presence of nitrates in certain mineral waters at Aden and elsewhere, and on the production of saltpetre in India. In this paper was first given a sketch of the principles on which the analysis of mineral waters is conducted, and the results shown in the grouping together of the several acids and bases. The writer then proceeded to mention the results of an analysis of waters from five different wells at Aden made in 1851 ; these waters were remarkable, not only for the very large actual amount of saline impurities, but for the presence in four out of the five cases of a great deal of nitric acid. The occurrence of water of a similar nature in two wells at Nassick was alluded to, and several published analyses of water, containing nitric acid from springs in Europe, were adduced. The inquiry had led the writer to the idea that a volcanic soil was peculiarly favourable to the occurrence of nitric acid in the under-ground water.

The process of nitrification was then discussed, and analyses of nitre-yielding earths in India, Ceylon, France, and Hungary, quoted. The writer expressed the opinion that in India much of the nitric acid was in combination with soda, and that this portion, owing to the solubility of the nitrate of soda, was in a great measure overlooked and lost. This opinion was supported by the analysis of a saltpetre earth from Guzerat, in which there was three times as much of the latter salt as of nitrate of potash. Practical suggestions were offered for preventing the waste of the valuable nitric acid thus occasioned ; and the attention of observers was drawn to a series of questions regarding the soils which yield nitrate of potash and carbonate of soda, respectively.

Dr. Scott remarked, in allusion to the writer's statements as to the formation of nitric acid from the oxidation of ammonia evolved from decomposing animal matter, that the water in the wells of large towns, as in Ahmedabad, became sensibly deteriorated in course of time from this contamination. He also mentioned the existence of very numerous graves in the cantonment of Aden, and suggested these as the origin of the nitric acid in the waters.

The reading of Dr. Haines' paper occupied a considerable time, and was listened to with marked attention, as embracing much original research, and unfolding clear views on an intricate, although practically interesting subject. This paper is the first of a series of Chemical Notes the writer intends to bring before the Society at certain intervals for publication in the Society's Transactions or elsewhere.

Owing to the lateness of the hour, the Report of the Committee assembled by order of Lieutenant General Sir H. Rose, K.C.B., to inquire into the

circumstances attending death from Sun-stroke before Koonch, 7th May 1858, was merely read, and its discussion postponed to the next Meeting of the Society, when the subject of "*Coup-de-Soleil*" will be considered.

After the best thanks of the Meeting had been accorded to the contributors, it was adjourned to Saturday, the 4th September 1858.

No. 6.

MONTHLY MEETING HELD 4TH SEPTEMBER 1858.

Present;

J. Scott, Esq., *President*, in the Chair.

W. Arbuckle, M.D., *Vice-President.*

Members.—B. P. Rooke, M.D.; J. W. Winchester, LL.D.; R. Woosnam, Esq.; W. Campbell, M.D.; J. Peet, M.D.; C. C. Mead, Esq.; J. Bean, Esq.; R. Haines, M.B.; G. R. Ballingall, M.D.; G. C. M. Birdwood, M.D.; H. V. Carter, M.D.; and W. C. Coles, M.D., *Secretary.*

The proceedings of the last Meeting were read and confirmed.

A letter was read from T. Crawford, M.D., Surgeon, H. M.'s 18th (Royal Irish) Regiment, applying to become a Member of the Society, and forwarding a remittance. Dr. Crawford, after being proposed and seconded, was duly elected a Member of the Society under Regulation VI.

An Appendix to the American Institutes of Medicine, entitled "The Rights of Authors," by Dr. M. Paine, was laid upon the table.

The subject of "*Coup-de-Soleil*" or "Sun-stroke" was then resumed. Dr. Peet read a paper on the pathology of the disease, reviewing the different opinions which have been entertained from time to time regarding its nature and seat. As this paper will be continued at the next Meeting, and will, probably, be hereafter published in the Society's Transactions, it does not seem necessary to notice it further.

It may not, however, be uninteresting to state briefly the circumstances which gave rise to the formation of a Committee of Medical Officers on the Central India Field Force, in May last, to investigate the subject of "Sun-stroke," and the conclusion they arrived at on the subject.

The attention of the Superintending Surgeon, Dr. Arnott, was arrested to the somewhat remarkable fact that of the two European regiments engaged at the affair before Koonch on the 7th May 1858, the Right Wing of H. M.'s 71st Regiment, about 425 strong, had twenty attacked with "Sun-stroke," of whom seven died; whilst the portion of the 3rd Bombay Europeans, about

330 strong, had not only no casualty from, but no man attacked by, this disease, although both corps were equally exposed to the same causes of disease, and were under circumstances, to all appearance, precisely similar.

The Superintending Surgeon proposed that the Committee should inquire into the supply of drinking water to each corps during the day, to the allowance of food and grog previous to going into action, to their dress and equipment, and to the declimitisation of the men to India.

Dr. Arnott states—"Should the inquiry elucidate, in the slightest degree, what predisposes most to this formidable malady, so that the causes might be known and avoided, it would be conferring a blessing of inestimable value on armies obliged to take the field in the hot season in India, with the thermometer standing, as it now does, on an average at upwards of 110° in our tents.

The Committee was composed of three Medical Officers,—the Surgeon of H. M.'s 14th Dragoons, the Surgeon of H. M.'s 71st Highlanders, and the Assistant Surgeon of the 3rd European Regiment. The prosecution of the inquiries by the Committee could not, however, be regularly conducted, owing to urgent professional calls upon their time in the immediate vicinity of the enemy; nevertheless they submitted a minute and comprehensive report, of which the following is a brief summary:—Although no difference could be traced with respect to the food, rations, and grog issued to both corps, and although the men of each regiment partook of their allowances for the day at the same time (neither corps going into action under the influence of either excessive repletion or the reverse), yet the supply of drinking water before Koonch among the 71st, tolerably abundant until about 11 A. M., was by no means sufficient from that hour until 3 P. M., whilst in the 3rd European Regiment the supply appears to have been scanty at first, but more plentiful from 12 o'clock onward. Between the hours of 11 A. M. and 3 P. M. both corps were equally exposed to the rays of the sun in an open plain, where no shelter was obtainable.

The general dress of both corps was well suited for field service in the hot months, that of the 71st admirably so, being loose, comfortable, and allowing the free unrestrained use of every limb. No stock or neckerchief was worn by either corps before Koonch, or if any thing was put round the neck, it was a low, soft stock or neckerchief. The head-dress of the 71st, consisting of the ordinary regimental Highland bonnet and peak, with a cap-cover of thick cotton cloth, of a grey colour, a roller stuffed with cotton, and a broad flap hanging down behind, was deemed superior to that of the 3rd Europeans, which consisted of the ordinary Kilmarnock cap, with a dark reddish orange-coloured turban folded round, with a portion of it hanging down behind.

The men of the 71st Regiment carried 60 rounds, whilst those of the 3rd Europeans only 40 rounds of ammunition in their pouches.

The Committee lay considerable stress on the antecedent circumstances of the two corps, as follows :—

The 3rd Europeans, of about an average service of three years in India, took the field in July and October 1857, and although employed on arduous duties, including the siege of Jhansi, enjoyed, as a corps, general good health. They were gradually trained to field duties, during the most favourable period of the year, and were more or less inured to the climate, from previous residence in the country.

The 71st Highlanders arrived in Bombay at the beginning of February 1858, by the Overland route, and the Right Wing was forwarded by bullock train to Mhow, which station it left at the end of March for Goonah and Jhansi, *i. e.* at the commencement of the hot season, and under circumstances of great disadvantage to a newly arrived corps. The marches, from being doubled, were sometimes very long, and the weather, particularly after leaving Goonah, became very hot (on the 22nd April the thermometer stood at 120°). The badness of the roads, breakage of carts, &c., interfered with the pitching of the camp before the sun was well up, but this was obviated after camel carriage was procured at Jhansi, a description of carriage the 3rd Europeans had not been without.

The transition from a comparative state of inaction to one of great and continued exertion, in the hottest season of the year, overtaxed the men's powers, and there was insufficient time or opportunity of recovery, which was increased by continued interruption to, and insufficient supply of natural rest, conjoined with more or less unavoidable exposure to the sun. Their nervous and muscular powers were, consequently, in a state of great exhaustion, and their powers of resisting the causes of disease diminished in proportion.

The ages of the men of the 71st Regiment, who died from sun-stroke before Koonch on the 7th May, varied from 22 to 32 years. They were amongst the most athletic men of the regiment; one was noted as "a free liver," another "tolerably free," and the remainder bore the character of "sober."

After some points in Dr. Peet's paper had been discussed, Dr. Haines read a communication consisting of two additional notes to the paper brought forward at the last Meeting.

The first gave an outline of the Topography of the Peninsula of Aden, and a description of the locality of the principal wells. Reference was made to the recent report of Lieutenant Wilkins, and the view therein expressed, that the water of the wells was derived from the local rain-fall, was considered to be established; explanation was offered as to the difference in the quality of these waters at different times.

In the second note, a sketch was given of the present state of our knowledge of the process of nitrification, as exhibited in the numerous interesting

memoirs which have been communicated to the learned bodies of England and France during the last three years.

Dr. Ballingall's contributions were deferred to the next opportunity, and after the best thanks of the Meeting had been accorded to contributors, it was adjourned to Saturday, the 2nd October 1858.

No. 7.

MONTHLY MEETING HELD 2ND OCTOBER 1858.

Present;

A. H. Leith, M.D., *Vice-President*, in the Chair.

Members.—R. J. O'Flaherty, Esq.; H. J. Carter, Esq.; W. Campbell, M.D.; J. Peet, M.D.; H. Giraud, M.D.; C. C. Mead, Esq.; J. Bean, Esq.; R. Haines, M.B.; G. R. Ballingall, M.D.; G. C. M. Birdwood, M.D.; H. V. Carter, M.D.; and W. C. Coles, M.D., *Secretary*.

The proceedings of the last Meeting were read and confirmed.

Letters were read from E. F. Wheatley, Esq.; W. E. Cates, Esq.; and C. K. Colston, Esq. (in reply to Circular), intimating their desire to continue Members of the Society on the expiry of two years from entering the Service.

The following gentlemen were elected Members of the Society on their admission into the Service, and for a period of two years, under Regulation VII.:—J. T. McKenzie, Esq.; G. Y. Hunter, Esq.; E. H. R. Langley, A.B.; W. McCloy, Esq.; E. Lawrence, Esq.; H. T. Daun, A.B., M.B.; C. W. Fettes, Esq.; F. Goold, Esq.; H. F. McGrath, Esq.; W. Fleming, Esq.; P. W. Cockell, Esq., and R. Buastead, Esq.

A copy of Dr. Leith's Mortuary Returns, "Deaths in Bombay," presented by the Director-General Medical Department, was laid on the table.

Dr. Ballingall then read Notes on Operations for Elephantiasis, and detailed cases in which he had operated successfully, particularly in one instance lately in the removal of a mass weighing upwards of one hundred pounds (102 lbs. avoirdupois), the patient being now quite well. This paper will be published hereafter in the Society's Transactions.

The Secretary read a communication from R. H. Jones, M.D., Staff Surgeon, Kurrachee, received in May last, but unfortunately mislaid, upon a species of Gum, of astringent quality, common throughout Western Australia, and of considerable commercial value. From the description given by Dr. Jones, it was believed to be a species of Kino, probably the Botany Bay Kino (*Eucalyptus resinifera*), which is considered to be inferior to the ordinary

Kino (*Pterocarpus marsupium*), and conjectured by Pereira to become gelatinous when made into tincture.

Dr. Haines read a short paper on a new vegetable alkaloid, extracted from the bark of the *Wrightia antidysenterica*, the "*Khooda*" of the bazaars. The alkaloid is resinous and uncrystallisable, of a powerfully bitter and somewhat acrid taste, insoluble in water, but very soluble in alcohol, æther, and chloroform. It exists in very minute proportion in the bark, only one part being procurable from one thousand parts of dry bark; it is supposed that the seeds contain it in much larger quantities. A specimen of the juice-alkaloid was exhibited, and its alkaline nature shown by experiment. The writer proposed to give it the name of "*Nereine*," from the former name of the plant which yields *Nerium antidysenterica*. It is believed that this is the first alkaloid which has been extracted from the generally acrid and poisonous family, the Apocyneæ, to which the plant belongs.

Reference was made by the writer to some experiments by Mr. Bhawoo Dajee, communicated to the Grant College Medical Society in October 1855, in which a precipitate had been obtained from a decoction of the seeds of the same tree, supposed, but not proved, to contain an alkali. Mr. Haines explained that his experiments were entirely independent of the above.

Mr. Carter brought forward a memorandum he had drawn up, "On the Leeches of Western India," for publication in the Society's Transactions. He mentioned that the difference between the Matharan and common leech consisted in the following particulars :—The common leech is about one inch in length, of an olive-green colour, has seven lines down its back, but no black spots, twelve eyes, arranged quadrilaterally, an uneven lip, with its centre notched, and is *aquatic*. The Matharan leech is about three-quarters of an inch long, of a light reddish-brown colour, has a black line down its back, and is covered over with black spots, ten eyes arranged in a semicircle, a smooth lip, with centre projecting, and is *terrestrial*. Dr. Carter remarked that a "species of Matharan leech appears to be common throughout the jungles in this part of India as well as in the islands of Ceylon and Madagascar, and is so abundant, active, and voracious, that it becomes a considerable obstacle to those who have to pass through localities infested by them, not only extracting a large quantity of blood, but often producing irritable and festering ulcers."

An interesting communication was then read from Dr. Broughton, Civil Surgeon, Kolapore, detailing a case of poisoning by the common Oleander (*Nerium odorum*), in which a man about 35 years old (a Mahratta) swallowed about an ounce of the expressed juice, and immediately fell senseless on the floor. He did not recover even by vigorous treatment from a state of collapse under 40 hours, and during that time had constant spasmodic seizures of the whole body. This case was considered by the Meeting to be unique, and well worthy of record. Dr. Broughton says—"It may be that in this case

the rapidity and peculiarity of the action of the poison was idiosyncratic to the individual, and I should be glad if any Member of the Society would oblige me with the results of his experience upon the same, when, if any discrepancy was found to exist, it might be worth while to institute a series of experiments upon the action of the Oleander, and I am ready to conduct the enquiry should the Society consider it to be desirable."

After the best thanks of the Meeting had been accorded to the contributors of papers, it was adjourned to Saturday, the 6th November 1858.

No. 8.

MONTHLY MEETING HELD 6TH NOVEMBER 1858.

Present ;

A. H. Leith, M.D., *Vice-President*, in the Chair.

W. Arbuckle, M.D., *Vice-President.*

Members.—J. W. Winchester, LL.D.; R. Woosnam, Esq.; H. J. Carter, Esq.; J. Peet, M.D.; H. Giraud, M.D.; G.R. Ballingall, M.D.; G. C. Birdwood, M.D.; and W. C. Coles, M.D., *Secretary.*

The proceedings of the last Meeting were read and confirmed.

Letters were read from the Superintendent of the Government Observatory, forwarding copy of the Meteorological and Magnetical Observations for 1857; from Assistant Surgeons Mennie and Cates, requesting to continue Members of the Society.

The following gentlemen were elected Members of the Society on their admission into the Service, for a period of two years, under Regulation VII.:— Assistant Surgeons MacDougall and Hopkins.

Dr. Peet then read a continuation of his paper on *Coup-de-Soleil*, commenced at a former Meeting.

As this paper is likely to be hereafter published, a brief sketch need only now be given. Dr. Peet remarked that our knowledge of the deranged conditions which are related to elevated temperature is as yet very imperfect, a fact sufficiently apparent from the various designations applied to them, viz. "Coup-de-Soleil," "insolation," "ictus solis," "heat-apoplexy," "sun-fever," "remittent fever," "ardent continued fever," &c. This want of precise information, he considered to be partly due to the inherent obscurity of these affections, but chiefly, perhaps, to the absence of minute and trustworthy records. The earlier published accounts are few and meagre, and later observers have recorded their observations without plan or system, and often but

in little detail. But it should be borne in mind that the morbid effects of high temperature on a large scale are only witnessed on long and harassing marches, or in the field; and hence the medical observer is exposed to the same enervating influences which have prostrated the patient he is called upon to assist. It should therefore not be a matter of surprise that the symptoms of these affections are imperfectly detailed, or indeed frequently not detailed at all.

After noticing briefly the sources from which valuable information may be obtained, the pathology of the disease, in detail, was discussed as regards its connection with apoplexy, inflammation of the brain, and congestion of the lungs,—Dr. Peet's conclusions negativing the belief that it is even closely allied to all or to any of these conditions. The probability of an absolute increase in the temperature of the blood and of the solid tissues being intimately concerned in its production was then noticed, and the views of the late Mr. Hill, of the Bengal Service, as to its occasional dependence upon malaria, were dwelt upon at some length. The question of how far the affections were produced by the direct and by the indirect action of the sun was next considered, and examples of each mode of production were brought forward; and lastly, the important question of how far the disease was caused by the action of heat alone (upon which some doubt was thrown by the fact that high degrees of artificial and even of natural heat, under certain circumstances, are borne without inconvenience or suffering) was fully discussed.

The symptoms of the disease were then detailed and illustrated by cases which had occurred during the campaign in Central India, placed at the writer's disposal by the Director-General Medical Department, and Deputy Inspector General H. M.'s Service. The following are some of Dr. Peet's conclusions:—

1. That more full and detailed accounts of the antecedent circumstances of the patient, and of the symptoms, progress, and termination of these affections are requisite before a true pathology can be arrived at.

2. That there is reason to believe that an absolute rise in the temperature of the blood and solid textures—due to a suspension of the functions of the skin—is an essential part of the pathology.

3. That too much attention has been paid to the head as the seat of the lesion, and that very serious errors have been committed by connecting the pathology of this disease with that of apoplexy, and of inflammation of the brain.

4. That in regard to treatment, active depletion is altogether inapplicable in the great majority of cases, and that even a full, firm, and frequent pulse, with signs of cerebral determination, does not always indicate blood-letting, which on the contrary is sometimes, in such cases, very injurious.

5. That experience has shown that blood-letting has sometimes been beneficial, but in the present state of our knowledge it is altogether impossible

to select the cases in which it is likely to be serviceable from those in which it is certain to be injurious.

6. That in all cases cold water should be used; in those where the skin is pungently hot, and the pulse of tolerable volume, in the form of *Douche*, the water being poured from a considerable height; in those cases where the pulse is feeble, small, and fluttering, it should be merely applied to the surface, or sprinkled over, or momentarily dashed on the face; when the pulse is feeble from the first, stimulants should be given.

7. That the administration of diaphoretics, purgatives, and other eliminents must be regulated according to general principles.

Considerable discussion ensued on the several points brought forward, in which nearly all the Members present joined. It was proposed and seconded, that the best thanks of the Society be given to Dr. Peet for his valuable and interesting communication.

A paper on the application of the philosophy of heat to clothing, by Assistant Surgeon McDowall, was then read; and after the usual vote of thanks was accorded, the Meeting adjourned to Saturday, the 4th December.

No. 9.

MONTHLY MEETING HELD 4TH DECEMBER 1858.

Present;

A. H. Leith, M.D., *Vice-President*, in the Chair.

Members.—J. W. Winchester, LL.D.; R. Woosnam, Esq.; W. Campbell, M.D.; J. Peet, M.D.; J. M. Hyslop, M.D.; C. C. Mead, Esq.; G. R. Ballingall, M.D.; and W. C. Coles, M.D., *Secretary*.

The proceedings of the last Meeting were read and confirmed.

Letters were read from Assistant Surgeon R. C. McConnell, requesting to continue a Member of the Society; and from Assistant Surgeons T. A. F. Scott, H. R. MacDougall, and N. Hopkins, on being elected Members for two years, under Regulation VII.

The following books, presented by the Director-General, Medical Department, were laid on the table:—"Vaccination Report for 1857 and 1858 in the Bombay Presidency"; "Vaccination Report for 1857 in Madras"; "Selections from the Records of Government North-West Provinces, Part XXXI."

The Annual Report of the European General Hospital for the official year ending 31st March 1858 was then read. This Report will hereafter be published in the Society's Transactions.

It appears that, during the year, there were 1,870 patients admitted into the hospital, a number which far exceeds that of any former year, and is 686 more admissions per annum than the average number during the last 10 years.

On the 1st April there were 120 patients in the hospital.

The severity of the cases that came under treatment was unusual, and the ratio of the fatal to the recovered cases was affected also in some degree by the necessity of excluding from the crowded wards many slight cases that would have been taken into hospital in former years.

A Report on Epidemic Cholera, which prevailed at Aden during the month of October 1858, by Sub-Assistant Surgeon Ruttonjee Hormusjee, was then read. This report relates to cholera as it appeared amongst the laborers of the Engineer Department at Aden, and some sepoys admitted into the Native General Hospital. It enters into the history, origin, and cause of the disease; details the symptoms present, the *post-mortem* appearances, and the preventive measures adopted. There were 136 cases treated by the Sub-Assistant Surgeon, 85 of which proved fatal, being 125 per cent. The disease appears to have been at its height about the 5th October, when 32 patients were admitted into hospital: the deaths took place chiefly on the 2nd, 3rd, 4th, 5th, and 6th October; the last death happened on the 17th, and there was only one admission after the 15th. The report was considered by the Society to be extremely well drawn up, and very creditable to the Sub-Assistant Surgeon.

Dr. Ballingall then described an interesting case of Femoral Anuerism cured by pressure, and exhibited the apparatus and instruments by which the pressure on the artery was made. The patient was discharged quite well, and the cure effected was most satisfactory.

The consideration of the other papers was deferred until another opportunity.

After the best thanks of the Meeting had been accorded to Dr. Ballingall and the contributors of papers, the Meeting was adjourned to the 8th January 1859, when the Annual Meeting will be held.

No. 10.

ANNUAL MEETING HELD 8TH JANUARY 1859.

Present;

A. H. Leith, M.D.; J. W. Winchester, LL.D.; W. Arbuckle, M.D.; H. J. Carter, Esq.; W. Campbell, M.D.; J. Peet, M.D.; H. Giraud, M.D.; W. C. Coles, M.D.; and C. C. Mead, Esq.

The Secretary read the following Report:—

Annual Report.

The practice which, for some years, prevailed of reading at the Annual Meeting a short review of the occurrences of the year fell into disuse in 1857 and 1858, but may be now resumed.

During the past year there have been eight Ordinary Monthly Meetings held, and the attendance on each occasion must be considered to have been good, and equal, at least, to the average attendance of former years.

Eight new paying and seventeen new *non*-paying Members have joined the Society since the last Annual Meeting.

At the beginning of the year, and shortly after his election as President, the Society lost the valuable aid and co-operation of Dr. Morehead, and at a time when the great interest taken by him in the success of the Society would have been productive of much good. Since his removal to Poona, however, he has indirectly contributed to the interest of the Monthly Meetings; and his "Memorandum on the Sanitarium at Poorundhur," presented by the Director-General, Medical Department, was read at the August Meeting.

The largest number of papers laid before the Society has been forwarded by the Director-General, Medical Department, who, as Patron of the Society, has continued to promote its welfare. Amongst these papers the Topographical descriptions of Belgaum, Jacobabad, and Sawunt Warree, the Annual Report of the European General Hospital, &c. &c. may be mentioned.

The chief original contributors have been Messrs. Carter, Peet, Ballingall, and Haines; and the subjects investigated by them have been of various interest and importance. That of "Coup-de-soleil" by the Professor of Medicine, occupied the attention of two consecutive Meetings; the Surgical cases and the observations on Elephantiasis, by the Professor of Surgery; the Medico-legal cases, by the Coroner's Surgeon; and the investigations into the habits of "the Dracunculus," "the Naïs," and Leeches, also by Dr. Carter, as well as the Chemical papers by Dr. Haines, have been listened to with much attention, and will become of great value when placed upon permanent record in the pages of the Society's Transactions. The Secretary contributed a paper on the health of the European troops lately arrived; and Drs. Broughton and Glasse have also favoured the Society with original communications.

It has been a matter of regret to the Committee that circumstances have prevented the publication of the Transactions being commenced before now, but an endeavour will be made to ensure their appearance within the next few months. The practice of publishing a volume once in two years will, it is hoped, not be departed from; but as the last volume was brought up to the close of 1856, the volume for the years 1857 and 1858 is only just now due.

The contributions to the Library have been chiefly made by Government,

by the Director-General, Medical Department, and by local Societies. The special thanks of the Society are due to the Editors of the Dublin Quarterly Review, and of the Association Monthly Journal, both of which periodicals are regularly supplied.

The Funds of the Society have been considerably advanced, as will be seen by the annual statements of the accounts now laid on the Table; the receipts have steadily increased, whilst the expenditure has been small. The balance, therefore, in the Bombay Bank will assist towards defraying the expense of printing a volume of the Transactions.

Annual Statement of Receipts and Disbursements of the Medical and Physical Society, from 1st January to 31st December 1858.

Receipts.	Amount.	Disbursements.	Amount.
	Rs. a. p.		*Rs. a. p.*
Balance of last Account closed on the 31st December 1857	491 8 5	Amount paid for printing Circulars, &c.....	53 0 0
Subscriptions received from 1st January to 31st December 1858	951 12 0	Office Establishment and petty charges, &c.	137 8 0
		Balance in the Bombay Bank	1,252 12 5
Rupees..	1,443 4 5	Rupees..	1,443 4 5

The election of the Committee of Management for the year 1859 by the votes of all Members of the Society (who had recorded their votes) was declared. The following gentlemen were found to be elected :—A. H. Leith, M.D.; J. W. Winchester, LL.D.; W. Arbuckle, M.D.; H. J. Carter, Esq.; J. Peet, M.D.; H. Giraud, M.D.; W. C. Coles, M.D.; and G. R. Ballingall, M.D.

The election of Office-bearers then took place, when Dr. Leith was unanimously elected President, Mr. Carter and Dr. Peet, Vice-Presidents,—Dr. Coles continuing in office as Secretary.

After the examination of the accounts of the Society, and transaction of ordinary business, the Meeting adjourned.

REGULATIONS

OF THE

MEDICAL AND PHYSICAL SOCIETY OF BOMBAY.

ESTABLISHED 1835.

Objects.

I. The encouragement of the cultivation of Medical Science and its collateral branches, by discussion at periodical meetings, and by the publication of original communications.

Constitution.

II. The Society is composed of Ordinary, Corresponding, and Honorary Members.

Ordinary Members.

III. Under the head of Ordinary Members are to be classed all who contribute to the funds of the Society, and all who are admitted in accordance with Regulation VII.

IV. All Medical men residing in India, who can produce certificates of a regular medical education, are eligible as Ordinary Members.

V. Medical Officers of Her Majesty's Indian or British Services are elected Ordinary Members of the Society, on application by letter addressed to the Secretary.

VI. Qualified Medical Practitioners, not belonging to Her Majesty's Indian or British Services, are elected by ballot at the ordinary meetings of the Society, and a majority of three-fourths of the Members present is necessary to secure the election.

VII. Assistant Surgeons, on first entering the Bombay Medical Service, are considered Ordinary Members of the Society, free of the payment of admission fee and annual subscription, and continue so for a period of two years, after which, should they not intimate their wish to be considered Ordinary Members by payment of the regulated admission fee and annual subscription, they are considered to have withdrawn from the Society.

Payments.

VIII. Ordinary Members pay an admission fee of Rs. 5, and an annual subscription of Rs. 12, payable in advance in the month of January of each year.

IX. Ordinary Members, absent from India, are not chargeable with subscriptions for the period of their absence.

X. Ordinary Members, neglecting to pay their annual subscription for two successive years, are considered to have withdrawn from the Society, and are liable to have their names erased from the list of Members, under a resolution passed to that effect at an ordinary meeting of the Society.

Corresponding Members.

XI. Ordinary Members, on retiring from service in India, on being proposed and seconded at an ordinary meeting of the Society, are eligible, by ballot, as Corresponding Members. A majority of four-fifths of the Members present is necessary to secure their election.

Honorary Members.

XII. Medical men of celebrity, not residing in India, are eligible as Honorary Members. On being proposed and seconded at an ordinary meeting of the Society, they may be elected at the next meeting by the unanimous consent of the Members present.

Election of Office-bearers.

XIII. The Committee of Management of the Society consists of eight Members, elected annually from among the Ordinary Members resident in Bombay, by the general vote of the Ordinary Members residing under the Government of Bombay.

XIV. The Voting Lists are circulated in the first week of November of each year, and the result of the election is declared at the annual meeting of the Society.

XV. In the event of vacancies occurring in the Committee between the periods of election, such vacancies to be filled up in rotation by the individuals who commanded the number of votes next to those of the Members returned at the last election.

XVI. A President and two Vice-Presidents of the Society are elected annually from among the Members of the Committee of Management by the Members of the Society present at the meeting at which the annual election of the Committee is declared.

XVII. The Secretary of the Society is elected biennially from among the Ordinary Members resident in Bombay at the annual meeting held in the month of January of alternate years, or, on the occurrence of a vacancy, at any other ordinary meeting of the Society.

Committee of Management.

XVIII. The Committee of Management have the general direction of the affairs of the Society, and decide on what communications are to be published in the Transactions of the Society. They keep minutes of all their proceedings,

which are entered into the Minute-book of the Society, and read at the following ordinary meeting.

XIX. When questions of importance to the stability and interests of the Society arise, they shall be submitted by the Committee for decision to the Ordinary Members residing *under the Government of Bombay*. The majority of votes necessary to decide any question, to be determined according to its importance, and fixed at the time by the Committee.

XX. It shall form part of the duty of the Committee to give due consideration to all suggestions offered by Members of the Society.

President and Vice-Presidents.

XIX. The President shall take the Chair and conduct the business at all meetings of the Society.

XXII. In the absence of the President, one of the Vice-Presidents shall take the Chair, and conduct the business of the meeting; and in case neither be present, the senior Member at the meeting shall preside.

Secretary.

XXIII. The Secretary is a Member of the Committee of Management *ex officio*.

XXIV. It shall be his duty to enter into the Minute-book of the Society minutes of the proceedings of all meetings and transactions of the Society, and, in communication with the Committee of Management, to conduct the details of business, and carry on the correspondence of the Society.

XXV. The Secretary shall prepare an annual statement of the receipts and disbursements of the Society, to be laid before the annual meeting in the month of January of each year.

XXVI. To enable the Secretary to perform these duties, a suitable establishment is entertained, under the sanction of the Committee of Management, confirmed at an ordinary meeting of the Society.

Meetings.

XXVII. Ordinary meetings of the Society are held in Bombay on the first Saturday of every month, except in April, May, and June.

XXVIII. The chair being taken, the order of business shall be as follows:—

1. The minutes of the last meeting, and those of subsequent Committee meetings, to be read and confirmed.
2. The announcement and election of new Members, in accordance with Regulations V. VI. and VII.
3. The election of Corresponding and Honorary Members.
4. The reading of letters, and the discussion of any ordinary business of the Society which may be before the meeting.
5. The announcement of presents and donations.
6. That of papers and dissertations received since the last meeting.

XXIX. After the announcement of the papers and dissertations, the President shall call upon the Secretary to read one or more of them, and shall subsequently

invite the Members to discuss any particular part of them which they may consider deserving of remark.

XXX. No new business shall be introduced until that which is before the meeting has been concluded.

Papers and Dissertations.

XXXI. All papers and dissertations presented to the Society to be considered the property of the Society.

XXXII. The Transactions of the Society are published by the Secretary, in communication with the Committee, as often as circumstances will admit.

XXXIII. A copy of each publication is presented to the Honorary and Corresponding Members of the Society, and to every Ordinary Member who, at the time of publication, is a contributor to the funds of the Society.

N. B.—All communications addressed to the Secretary or Treasurers must be prepaid.

Members are requested to pay the amount of their subscriptions to the Bank of Bombay, Treasurers to the Society.

☞ The Publications of the Society are for sale by Messrs. Chesson & Woodhall, Booksellers, Bombay, the Society's Agents.

The First Series of the Transactions of the Society consist of—

No.	1, 1838.....	Pp.	370	Rs.	5
,,	2, 1839.....	,,	269	,,	5
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The Index to the above				,,	1

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No.	1, 1851-52	Pp.	356	Rs.	5
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FOR THE YEAR 1858.

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FOR THE YEAR 1859.

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